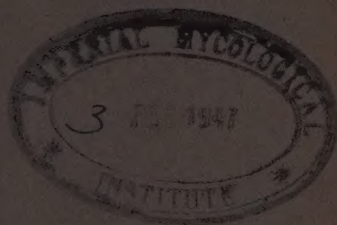


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Vol. 16. No. 12. pp. 421-464  
Abstracts 2424-2664

December, 1946



# THE VETERINARY BULLETIN

1946

*The delay in publication is regretted. It is due to the damage sustained by the printers through enemy action. It is hoped that normal dates of publication will soon be resumed.*

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Owing to staff shortages it has not been possible to prepare annual indexes to volumes 14 and 15 of the *Veterinary Bulletin*. Subscribers will receive these as soon as they are available.

## REVIEW ARTICLES

- (1) "The Present Position of Phenothiazine as an Anthelmintic".
- (2) "Trichomoniasis—A Review of Recent Literature".

Reprints (price 1/6 and 2/6 respectively) obtainable from: Central Sales Branch (Imperial Agricultural Bureaux), Penglaig, Aberystwyth.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

A list of annotations and reviews, classified according to subject, is now given in *Index Veterinarius*, being inserted at the end of each number. Such papers will not necessarily be dealt with in the *Veterinary Bulletin*.

The Editor will be glad to receive publications relating to Veterinary Science and cognate subjects in order that they may be dealt with in the *Veterinary Bulletin*.

Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

#### Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.



## DISEASES CAUSED BY BACTERIA AND FUNGI

GUNDERSON, N. O., & ANDERSON, C. W. (1944.) A handbook on fast milking and the early control of bovine mastitis. pp. 17. Rockford, Ill.: Department of Public Health. 4to. Mimeographed. 2424

In the preface to this small handbook the authors describe it as a review of some of the newer concepts in the prevention of mastitis. "Likewise some of the ideas on fast milking, made possible through a clearer and better understanding of the physiology of the cow's udder, are discussed in terms of mastitis, following which the early detection and possible control of this disease is considered".

The subject matter, which takes the form of questions and answers, is divided roughly into two parts, the first dealing with the secretion and storage of milk and its removal from the udder and the second with the types of mastitis and their control.

Some useful practical information is given relative to the formation of milk within the secretory alveoli of the udder and the mechanism by which it drains into the cistern prior to its removal at milking time, together with some hints upon the effects of hormone secretion on milk supply. This leads to a discussion of the proper handling of cows both before and at the time of milking: the slogan "Milk from contented cows" is discussed in detail. Fast milking is advocated as essential for high production, with the statement that the faster a cow is milked, the better. The authors say that with properly fitting milking machine teat cups, proper vacuum and proper pulsation, cows can be milked in 2-4 min.

70-80% of chronic mastitis is caused by *Streptococcus agalactiae*; cows visibly affected should be immediately isolated. Certain aspects of the pathology of mastitis are discussed. Little practical information is given as to how the disease should be handled, apart from some useful hints on its prevention and herd hygiene by using a "germ test". The results of treatment with penicillin were not known at the time of writing.

Whilst it cannot be said that the book contains very much information new to the veterinarian, nevertheless it could be of considerable value to farmers and others as a pattern for general herd hygiene and disease control to be used either alone or in conjunction with a programme of treatment for mastitis.—J. C. BUXTON.

GRAVES, F. W. (1945.) Progress in the control of mastitis.—*J. Milk Technol.* 8, 266-271. 2425

According to G., more emphasis should be laid on the prevention of mastitis than upon curative measures; reasons are given for what he considers to be the lack of progress in controlling the disease. Successful control depends upon the early detection of the disease or of symptoms of abnormal milk, segregation of diseased or suspected cows, improved milking and sanitary methods,

elimination of sources of injury to the cow and the raising of replacement heifers.

Samples should be taken from the cows one hour after milking, the milk examined for gross abnormality by indirect and, if possible, by direct laboratory test and all hopelessly diseased cows destroyed. No details are given of treatment and the paper concludes with some recommendations for temporary and permanent drying-off of quarters, the latter by the introduction of ether gas.—J. C. BUXTON.

STAUB, A. M., & GRABAR, P. (1944.) Recherches immunochimiques sur la bactériémie charbonneuse. I.—Le liquide d'oedème de cobaye et les polyosides. [Immunochemical study of anthrax. I. The oedema liquid of the guinea pig and the polyosides.]—*Ann. Inst. Pasteur.* 70, 16-32. 2426

The authors studied the immunizing properties of anthrax oedema fluid, using a strain of bacilli which were unencapsulated and avirulent for g. pigs. They conclude that there exist in the oedema fluid and in the bacilli two antigens which are not nucleoproteins and which they have named polyoside *a* and polyoside *b*.

[The word "polyoside" is not defined, but appears to be equivalent to "polysaccharide" as used by Ivánovics.—V. B. 11, 280.]—M. C.

— (1946.) A depot for standard cultures of tubercle bacilli. Report of the committee on standard cultures of the Medical Research Committee of the National Tuberculosis Association.—*Amer. Rev. Tuberc.* 53, 511-514. 2427

With a view to avoiding one source of variation likely to arise in experiments on the chemotherapy of TB, the National Tuberculosis Association has agreed to the establishment of a depot at the Trudeau sanatorium which will maintain a limited number of standard cultures of *Mycobact. tuberculosis* whose virulence is assured by controlled methods of cultivation and frequent tests in animals. It is proposed to distribute subcultures to any investigator of repute. Full particulars are given of the strains to be selected, methods to be adopted for preparation of suitable suspensions for inoculation, time limits for virulence tests, and assessment of the degree of virulence by charting the severity of the disease.—R. E. GLOVER.

KOLESHNIKOV, C. A. (1945.) O meropriyatnykh po bor'be s tuberkulezom v SSSR. [Measures for the fight against TB. in the U.S.S.R.]—*Sovyet Med.* No. 1/2, pp. 1-8. [Abst. in *Bull. Hyg., Lond.* 20, 727, copied *verbatim*. Signed: H. H. SWANN.] 2428

The author states that the mortality rate from tuberculosis in 1943 was 8 per cent. less than the rate for 1942, and that the 1944 figure will show a further reduction. At the beginning of the war there were, for



tuberculosis in the U.S.S.R., 13 institutions, 358 dispensaries, 484 polyclinics, 25,100 beds in hospitals and 72,800 beds in sanatoria. At the beginning of 1944 the number of dispensaries in towns and villages had increased by 142 and 61 respectively over the number in existence two years earlier.

Vaccination with BCG, by the method originally used by Calmette, has been practised for 20 years, and the author is convinced of its value; he claims that the morbidity and mortality rates in vaccinated children are only about one-third of the rates in the unvaccinated, and thinks that BCG vaccination should be compulsory.

RUYS, A. C. (1946.) The influence of war conditions on bovine tuberculosis in man in Amsterdam.—*Mon. Bull. Min. Hlth Emerg. publ. Hlth Lab. Serv.* 5. 67-71. 2429

Prior to the outbreak of war, type determination showed that infection with bovine type organisms was fairly frequent in Holland. During 1933-38, 9.6% of all cases of pulmonary TB, and 17.2% of non-pulmonary cases in children in the age group 0-15 years was caused by bovine type organisms.

Although war conditions of bad housing, shortage of hospital and nursing services and decreased food supplies led to a marked increase in TB in all age groups, the incidence of bovine type infections showed a marked decline in Amsterdam. In the period 1940-44, bovine types were isolated from only 1.8% of pulmonary infections and 6.7% of non-pulmonary infections in children of the age group 0-15 years. The cause of this reduction is believed to be the pasteurization of practically all milk sold in Amsterdam.

An increase in TB of the cervical lymph node occurred in people of 50 years and over, but was not caused by bovine type infections.—M. C.

LEVINE, M. I., & SACKETT, M. F. (1946.) Results of BCG immunization in New York City.—*Amer. Rev. Tuberc.* 53. 517-532. [Spanish summary.] [English summary copied verbatim.] 2430

1. More than 2,000,000 children throughout the world have been vaccinated with BCG. 2. The published reports on the effectiveness of the vaccine as a prophylactic against tuberculosis have been predominantly optimistic. With few exceptions, these studies have been inadequately controlled. 3. Up to January 1, 1944, 2,084 children from "tuberculous homes" in New York City have been followed, of whom 1,011 were vaccinated and 1,073 held as controls. 4. A comparison is made of the tuberculosis mortality before and after alternate selection of cases. 5. Prior to the alternation of cases, the tuberculosis mortality of the controls was over four times that of the vaccinated group (3.38 as against 0.68 per cent). In the second period, following alternation, the figures for the two groups were essentially similar, the tuberculosis mortality of the vaccinated cases being 1.41 per cent as against 1.61 for the controls. 6. The possible effect of the following factors on the comparative results was assessed: parental cooperation, economic condition, racial distribution, exposure, lost cases and percentage of autopsies. 7. Routine separation of children for three months before and three months after BCG vaccination to eliminate the hazard of contiguous contamination with human tubercle bacilli was not found to be a feasible or safe procedure, although a small sample where such separation was possible (91 vaccinated and 96 control cases) indicated that the BCG inoculation might have protective value were such separation practical. 8. From a public health standpoint, however, the efficacy of BCG must be judged by its ability to reduce the tuberculosis mortality of children vaccinated in their homes in the midst of a tuberculous environ-

ment. 9. As a public health measure, therefore, the routine vaccination with BCG of children from tuberculous homes is less advantageous than removal of the tuberculous subject from the home.

GUNN, F. D., SHEEHY, J. J., COLWELL, C. A., & MILLS, M. A. (1942.) Experimental pulmonary tuberculosis in the dog. BCG immunization.—*Amer. Rev. Tuberc.* 46. 612-621. [Spanish summary.] 2431

It is suggested that the dog is well suited for studies of immunity to TB, since it possesses a high degree of natural resistance. The foci which develop in the lungs tend to regress and resemble those of the human subject.

Groups of dogs were immunized with BCG by various routes (subcutaneous, intratracheal and intravenous) and were subsequently tested by the intratracheal insufflation of a relatively high dose of either a bovine or human strain.

There was little difference in the mortality rate in the vaccinated and control groups. In the earlier stages, caseation was more common in the unvaccinated dogs but after a period of about 100 days significant differences between protected and control animals were not apparent; moreover, generalization occurred with equal frequency in the two groups. It would appear, therefore, that the natural high resistance of the dog to the respiratory form of the disease cannot be further enhanced by the injection of BCG.—R. E. GLOVER.

PELLEGRINI, D. (1942-45.) Tuberculosis spontanea del cammello in Somalia. Ricerche diagnostiche sperimentali. [Spontaneous TB. in camels in Somaliland. Experimental diagnosis.]—*Racc. Stud. Pat. vet., Somaliland*, No. 1. pp. 33-41. [English summary.] 2432

A spontaneous case of TB in a camel is recorded from Somaliland, the animal dying after six months of illness characterized by progressive debility and coughing.

Autopsy revealed caseous nodules in the liver, spleen and lymph nodes, but the principal lesions occurred in the thoracic cavity, with caseous nodules and granulomatous masses in the lungs, caseation of the mediastinal l. nn. and "grape" formation in the pleural cavities. In culture the bacillus concerned was dysgonic and growth was not favoured by glycerin. The organism proved pathogenic to g. pigs, rabbits, sheep and calves and it is concluded that it was a virulent strain of the bovine type bacillus.—U. F. R.

DREA, W. F. (1946.) Growth inhibition of strain H37 of the human tubercle bacillus by 4-N-alkylresorcinols in the depth of a liquid, synthetic, nonprotein culture medium.—*J. Bact.* 51. 507-511. [Author's summary copied verbatim.] 2433

Hexylic acid and heptylic acid, to which equivalent molecular amounts of NaOH have been added, prevent the growth of  $10^{-2}$  mg (about  $10^6$  bacilli) of the H37 strain of the human tubercle bacillus in the depth of Long's liquid, synthetic, nonprotein culture medium when present in  $10^{-1}$  per cent concentrations and permit growth in  $10^{-3}$  per cent concentrations. Resorcinol under the same conditions has the same effect.

The corresponding  $\alpha$ -alkylresorcinols with the hexyl and heptyl chains substituted for the H atom in the 4-positions of the resorcinol molecules inhibit growth at  $10^{-4}$  per cent and permit growth at  $10^{-6}$  per cent concentrations.

Octyl, decyl, undecyl, dodecyl, and tetradecyl chain resorcinols have the same order of growth-preventing power. The first four of these are more inhibiting than the corresponding fatty acids or resorcinol. Tetradecyl



resorcinol has about the same growth-preventing effect as the corresponding myristic acid.

Ethyl, propyl, butyl, and amyl resorcinols have less growth-inhibiting power than the longer chain compounds but are more inhibiting than their respective fatty acids or resorcinol.

The addition of alkyl chains to the 4-position of the greatly inhibiting sodium ethylmercuri-thiosalicylate molecule, with or without the substitution of some other element for the Hg atom, may be of antibacterial importance in both *in vitro* and chemotherapeutic studies.

—Bactericidal effects were not studied.

DUBOS, R. J., & DAVIS, B. D. (1946.) Factors affecting the growth of tubercle bacilli in liquid media.—*J. exp. Med.* 83: 409-423. [Authors' summary copied verbatim.] 2434

Certain water-soluble esters of long chain fatty acids (in particular of oleic acid) favor submerged and diffuse growth of mycobacteria throughout the depth of synthetic liquid media. Esters of oleic acid increase considerably the amount of growth yielded by avian strains in synthetic media. The addition of serum albumin to synthetic liquid media permits visible growth of minimal inocula of virulent human tubercle bacilli (10<sup>-6</sup> mg.) within 11 to 15 days. Cultures growing diffusely in media containing the water-soluble esters—with or without albumin—consist of cells of classical morphology and staining properties, which again exhibit the usual mode of growth when returned to the standard synthetic or egg yolk media.

YEGIAN, D., BUDD, V., & MIDDLEBROOK, G. (1946.) Biologic changes in sulfonamide-resistant *Mycobacterium ranae*.—*J. Bact.* 51: 479-485. [Authors' summary copied verbatim.] 2435

A sulphonamide-resistant variant of *Mycobacterium ranae* has been shown to be slightly more susceptible to bacteriostasis by *para*-aminobenzoic acid than the parent sulphonamide-susceptible strain.

It was not possible to produce a change in the susceptibility of *M. ranae* to bacteriostasis by PABA or to sulphonamides by repeated transfers in a medium containing large amounts of PABA.

SCHALM, O. W. (1944.) Gangrenous mastitis in dairy cows.—*Vet. Med.* 39: 279-284. 2436

S. gives short descriptions of cases of bovine gangrenous mastitis encountered in the field and of his own animal inoculation experiments.

Whole 48-hour broth cultures of *Corynebact. pyogenes* from typical summer mastitis were inoculated through the teat canal of two quarters of a dry cow. The inoculum produced a marked reaction throughout the injected quarters, but five days after exposure the udder had practically returned to normal. S. suggests that *Corynebact. pyogenes* may be a secondary invader, able to multiply after the udder is damaged by the organism of primary importance.

Exudate from a natural case, from which *Staphylococcus aureus* was isolated, was injected through the teat canal of a lactating cow. Typical gangrenous mastitis developed. Similarly, the injection of whole broth culture of the isolated strain of *Staph. aureus* into the teat canal of a lactating cow produced a typical case. It seemed that the toxin in the broth culture was responsible for damaging the udder tissue and paving the way for the early onset of gangrene. Washed cultures were therefore used as the inoculum for the next experiment. Only a dry cow was available for this; it failed to develop gangrenous mastitis, but acquired a persistent infection.

Another dry animal was injected with whole culture

of *Staph. aureus* and also failed to develop gangrene. *Staph. aureus* toxin alone, injected into the udder of a lactating cow, caused a rise in temperature and swelling of the gland within a few hours; the swelling disappeared in three days. When this animal was injected six weeks later with whole culture, it seemed to have acquired some resistance to the organism; this was not great enough to prevent the establishment of infection, but was sufficient to prevent the onset of gangrenous mastitis.

Localized gangrene was produced in a lactating udder by the injection of whole broth culture of strains of *Staph. aureus* isolated from non-gangrenous udders.

Discussing the findings, S. concludes that the lactating udder is more sensitive to the destructive action of staphylococci than the dry udder; this is due, no doubt, to the greater vascularity of the former. He suggests that the gangrenous process probably develops as a result of injury to the vascular system of the udder, followed by thrombosis of the vessels.—I. W. JENNINGS.

GLEDHILL, A. W. (1945.) The antigenic structure of *Erysipelothrix*.—*J. Path. Bact.* 57: 179-189. 2437

G. examined the antigenic structure of 38 strains of *Erysipelothrix rhusiopathiae*. The work of WATTS [V. B. 11. 8] was confirmed in that the major antigens were found to be heat-stable. Prolonged boiling accounts for some of the differences which have been reported between sera prepared with boiled and unboiled antigens.

Four serological groups were defined by agglutination-absorption methods, using boiled antigens for the preparation of sera. Twenty of the 31 strains fell into these four groups. The remaining seven strains formed at least one additional group.

G. concludes that the antigenic structure of *Erysipelothrix rhusiopathiae* is qualitatively homogeneous. There is, however, a large number of antigens. The differences between the groups are either quantitative or in the spatial arrangement of the antigens.

—D. L. HUGHES.

\*HEGYELI, Z. [Pasteurellosis bubalorum in pigs].—*Közl. Összehas. élet- és hőrtan Körébél.* 31: 285. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* February 4th. 49-50. (1944).] 2438

H. has produced a serum that immunizes pigs simultaneously against swine fever and *Pasteurella bubalis* infection. He obtained this serum by hyperimmunizing pigs simultaneously with the virus of S.F. and with pig's blood infected with *Past. bubalis*.—E. KLIENEBERGER-NOBEL.

JELLISON, W. L., & PARKER, R. R. (1945.) Rodents, rabbits and tularemia in North America: Some zoological and epidemiological considerations.—*Amer. J. trop. Med.* 25: 349-362. 2439

Tularaemia is frequently defined as a disease primarily of rodents, although rabbits, which are by far the commonest source of infection for human beings, are not included by some zoologists in the order Rodentia, but are placed in a separate order Lagomorpha. Other zoologists regard them merely as a distinct sub-order, the Duplicidentata. The authors urge that epidemiologists should recognize this distinction between rabbits and other rodents.

The importance of various species of rabbits and hares as reservoirs of tularaemia is discussed and maps are given showing the distribution of these various species in North America.

The cottontail rabbits, *Sylvilagus* spp., especially *S. floridanus*, are by far the commonest source of human cases. Less than 0.3% of human cases of tularaemia are infected from other sources.—M. C.

PRINCE, F. M., & McMAHON, M. C. (1946.) Tularaemia. Attempted transmission by each of two species of fleas: *Xenopsylla cheopis* (Roths.) and *Diamanus montanus* (Baker).—*Publ. Hlth Rep., Wash.* 61. 79-85. [Authors' summary copied verbatim.] 2440

From 68 to 90 percent of *X. cheopis*, and 80 to 95 percent of *D. montanus* fleas became infected when given an opportunity to feed on tularaemia-infected white mice.

The disease was produced by the inoculation of infected fleas or of their feces for varying periods (up to 32 days in *X. cheopis*).

Fleas killed immediately after infection and stored at room temperature as long as 5 days in dry condition, or for 7 days in saline, produced tularaemia when triturated and injected into healthy mice.

Fifty-nine infected fleas (*X. cheopis* and *D. montanus*) biting 46 normal white mice 312 times failed to produce tularaemia in the mice.

Twenty-five fleas each of *X. cheopis* and *D. montanus* that were exposed to tularaemia-infected mice and then placed in clean cages with healthy guinea pigs did not produce the disease in animals over a period of 32 days.

SEARS, H. J. (1946.) Survival for fourteen years of agar slant cultures of *Escherichia coli-mutabile* without loss of important characters.—*J. Bact.* 51. 553-558. [Author's summary copied verbatim.] 2441

Plain agar slant cultures of two strains of *Escherichia coli-mutabile* and of the lactose-fermenting variant derived from one of them contained many viable cells after 14 years' storage at room temperature. No live cells could be demonstrated that required longer than 24 hours to germinate. No evidence of dissociation was observed in the subcultures. All three strains had retained their important biochemical characters and their ability, or lack of ability, to produce variants on lactose media. The probable mechanism of longevity of cultures on solid media is discussed briefly.

CHANCE, H. L., & ALLEN, W. C. (1946.) The influence of heavy water on the growth, morphology, and fermentation reactions of *Eberthella typhosa*.—*J. Bact.* 51. 547-551. [Authors' summary copied verbatim.] 2442

A study of the influence of heavy water up to 8 per cent in concentration in nutrient agar, *d*-glucose agar, and *d*-glucose broth was made.

The morphology of the organism was greatly influenced, especially by the higher concentrations in *d*-glucose broth. This was evidenced in cell shape, granulation, and bud formation. Although budding was much in evidence, binary fission remained the chief mode of reproduction.

Fermentation reactions after growth in heavy water were unchanged for the duration of the experiments.

Some growth factor was disturbed since cells from old heavy water cultures would not grow on agar slants but would grow in broth.

BRIDGES, R. F., & TAYLOR, J. (1946.) A critical examination of the organism described as *Bacillus wakefield*.—*J. Hyg., Camb.* 44. 346-347. [Authors' summary copied verbatim.] 2443

The organisms described as *Bacillus wakefield* and considered to be members of the Flexner group are not dysentery bacilli. They are paracolon bacilli containing  $\alpha$ -antigen.

JANSEN, J. (1941.) *Shigella equuli* (B. pyo-septicus equi)-infecties. (Literatuur en zelf waargenomen gevallen bij paard en varken). Klinische les. [*Bacterium equirulis* infection in horses and pigs.]—*Tijdschr. Diergeneesk.* 68. 687-692. [English,

French and German summaries.] [English summary slightly amended.] 2444

J. considers that all existing synonyms for the organism should be replaced by *Shigella equuli*. He isolated the organism not only from foals and piglets, but also from older animals, including a horse, 1½ years old, which had died from acute septicæmia. The organism was also isolated from pus from a nine-year-old horse with chronic funiculitis and from all organs of a pig which died of acute septicæmia.

GWATKIN, R., & BOND, E. W. (1945.) Studies in pullorum disease. III. Serological differences in strains of *Salmonella pullorum*.—*Canad. J. publ. Hlth.* 36. 160-166. [For previous articles, see *V. B.* 14. 150, abst. 967, and 16. 65, abst. 383.] 2445

GWATKIN, R. (1945.) Studies in pullorum disease. IV. The effect of bacteriophage on regular and variant strains of *S. pullorum*. V. Efficiency of homologous and heterologous antigens in detecting birds in a variant-infected flock. VI. Comparison of whole blood and tube tests with regular and variant antigen and a combination of the two antigens. VII. Transmission of infection to healthy birds by contact.—*Canad. J. comp. Med.* 9. 43-45, 183-191, 216-223 & 335-338. 2446

III. The difference was studied between regular and variant strains of *S. pullorum* as shown by agglutination tests with the sera of naturally and artificially infected birds, three strains being used for the standard antigen that were not subject to non-specific reactions. To obtain first-hand information, 800 day-old New Hampshire Red chicks from certified pullorum-free flocks were divided into two equal groups, one, referred to here as group 1, being injected with a regular strain and the other, group 2, with a variant strain of *S. pullorum*. Aggl. tests were undertaken at regular intervals, using both standard and variant type antigens.

As many as 18 antigens were used for each sample at the commencement of the work and to keep the number of tubes within a range that could easily be dealt with, sera were set up in the usual test dilution of 1:50. The first test carried out 32-42 days after exposure to infection was by the whole-blood method. Testing 80-102 days after exposure was by both the whole-blood and the tube methods, between which there was very good agreement. Controls were provided by the chickens in group 2 which did not become infected when exposed to old stock strains, by the normal contact birds in groups 1 and 2 and by 100 hens in a known negative flock.

The authors detail in tabulated form and analyse the results of consecutive tests of all experimental groups. Of 294 chicks tested 5-6 weeks after exposure by mouth to variant strains of *S. pullorum*, 191 were positive with variant antigen to the whole-blood test. Twenty of these were positive with regular type antigen. If positive and questionable reactions had been grouped, as in routine testing, 185 birds would have been missed by the regular antigen (approximately 89%). A second test of these birds was carried out between the 80th and 102nd days by whole-blood and tube tests. The regular antigen failed to detect 74 samples classed as positive or questionable by the variant type (68.5%). The recovery of the organism from chicks which had died of pullorum disease afforded proof of the specificity of the variant strain reactions which was further supported by the absence of reactions in known negative birds.

Among the miscellaneous samples tested, 63 chicks injected with the regular strains showed a preponderance of variant agglutinins six days after injection, but two months later, after further injections of the same organisms, the predominating agglutinins were of the regular type.



IV. This paper describes an attempt to differentiate types of regular and variant strains of *S. pullorum* by the use of a specific bacteriophage. In earlier work by G., a pullorum bacteriophage had been isolated for experiments *in vitro* and *in vivo*; the same method of procedure was followed in this instance. The filtrable agent was prepared by seeding a beef broth flask with a regular strain of *S. pullorum*, filtering through paper impregnated with fuller's earth and then through a Mandler candle (V). The filtrate was set up in serial dilutions in beef infusion broth, to which was added a suspension of *S. pullorum* no. 19, and was incubated overnight, resulting in complete lysis in the filtrate tubes up to a dilution of  $10^4$ . The lysed suspension was filtered through a V candle and identified as filtrate no. 2. In successive stages following the same procedure filtrate no. 3 was prepared from filtrate no. 2 and filtrate no. 4 from filtrate no. 3. This end-product, filtrate no. 4, was considered satisfactory for comparison of regular and variant strains.

Two experiments were undertaken, the first to compare four regular and two variant strains and the second to compare six regular and five variant strains. In the first experiment all six strains were lysed by a dilution of 1:1,000,000,000 of filtrate no. 4. In the second experiment a bacteriophage representing the sixth passage of that used in the first experiment caused complete or almost complete lysis of all strains used. G. concludes that while the number of strains was limited, there was no indication that the serological types could be differentiated by bacteriophagy.

V. In studying antigenic differences in strains of *S. pullorum*, 408 day-old New Hampshire Red chicks from a certified pullorum-free source were given *per os* individual doses of 0.25 ml. saline-suspended heart, lung and liver tissue obtained from artificially infected chicks. Cultures from all chicks that died were made from heart, liver and lungs on brilliant-green beef infusion agar.

Repeated tests of the infected group were made, and in December, at the age of 5½ months, the flock was divided into negative and positive groups. Evidence that they were originally negative was furnished by 460 chicks obtained from the same source and kept isolated at the Poultry Pathology Laboratory, Central Experimental Farm, Ottawa. In addition to cultural studies, histological examinations of the various organs of chicks from certain groups were undertaken. All birds that died during the experiment were examined for *S. pullorum* and others were killed for this purpose. A summary shows that of 125 mature birds, the organism was recovered from 80% of the positives and from 18.7% of birds negative at 1:50. In four cases *S. pullorum* was recovered from the thymus gland only. Regular antigen failed to detect 49% of the reactors. On each subsequent test some infected birds picked by variant antigen were missed by the regular strains. Three lots of eggs were hatched from the positive and negative groups. A large percentage of chicks from positive eggs died of pullorum disease, but the organism was not recovered from any of the chicks of the negative group.

VI. The results are detailed of a series of comparisons to determine the relative efficiency of the whole-blood and tube tests on a flock infected with the variant type of *S. pullorum*. The object of these comparisons was to determine whether a combined antigen could be successfully employed for detecting reactors to both types of infection in place of two separate antigens in the application of both the whole-blood and standard tube methods of testing.

The regular type K antigen was prepared according to the U.S. Bureau of Animal Industry formula, using

strains 4, 10 and 11. The variant type K antigen was prepared from Younie strains nos. 296 and 6. The tube antigens were prepared according to the method outlined in the Report of the Referee and Associate Referee on Standard Methods of Diagnosis of Pullorum Disease except that cultures were incubated for periods up to six days.

The antigen density was twice that of no. 1 McFarland nephelometer and a serum dilution of 1:25 was prepared with 0.9% saline so that the inaccuracies of adding undiluted serum to the various antigens could be avoided.

Five tables are included giving the comparative values of these different antigens when used to test flocks infected with variant strains only, as opposed to flocks infected with standard or regular strains. Comparison of whole-blood and tube tests on variant-infected birds showed an agreement of 96.5 and 97.3% respectively on two groups of 866 and 570 birds. Variant antigen was more efficient in detecting variant-infected birds than regular antigen.

The whole-blood test with regular antigen detected more of the variant-infected birds than the tube method with antigen prepared from regular strains; G. suggests that this may have been due to a greater concentration of serum in the whole-blood test. Comparison of variant, regular and mixed whole-blood antigens on 1,391 birds (746 variant and 645 regular) showed an agreement of 99.4% between the variant and mixed whole-blood results and 96.8% between the regular and mixed whole-blood tests, or 98.2% on the 1,391 samples.

VII. G. briefly reviews the literature and describes three experiments on the transmission of pullorum disease by contact. The first experiment dealt with the susceptibility of comparatively young chicks and the other two with the susceptibility of adult males and females, the degree of infection and progress of the disease being measured in each instance by applying the rapid whole-blood test and standard aggl. tube test, for which both regular and variant antigens were used. Subsequently all reacting birds were autopsied and cultures made from the testes, ovary, thymus, pericardium, kidney and spleen on plain and brilliant-green agar and beef infusion broth. The organisms recovered were checked by agglutination with variant serum and by seeding in peptone water containing lactose, maltose, sucrose, glucose and mannitol, with bromocresol purple as indicator.

A summary of the results shows that of the 51 chickens placed in an infected group of the same age when they were 40 days old, 37% became reactors and *S. pullorum* was recovered from 27% of those that died.

Two of ten adult males became reactors when placed in the infected group but the presence of *S. pullorum* was not confirmed on bacteriological examination.

Five of 17 adult females (29.4%) became infected by exposure in the same infected group. All were negative after two months. One was positive and two gave slight reactions after about four months, while after five months four more reacted positively. *S. pullorum* was recovered from all five positive birds.

This experiment shows that transmission of infection to clean birds in an infected flock is far from insignificant. Twenty-six of the 78 clean birds became infected (33.3%).—A. B. WICKWARE.

BRUN, W. (1946). Changes of the serum phosphatase level after infection of cows with *Brucella abortus*. —*J. Immunol.* 52, 137-144. 2447

Following the observation that the phosphatase level decreased in cows infected with *Br. abortus*, the author studied the possible relationship between

the production of agglutinins and the phosphatase level. In 39 cows with agglutination titres after infection with *Br. abortus* the average phosphatase level was significantly lowered for about two months after infection. In one exceptional animal which failed to show agglutinins after infection there was a rapid rise in the phosphatase level for five months.

The results are discussed on the basis of possible similarities between antibodies and phosphatase molecules, and on the grounds that antigens act as biocatalysts and that "specific antibodies formed as final reaction products in response to antigenic stimuli fulfil the function of specific inhibitors of enzymes".

Results may be explained by assuming that a *Br. abortus* antibody globulin acts as a specific inhibitor of phosphatase ("anti-phosphatase"). In the animal which failed to show agglutinins after infection the great increase in the phosphatase level may be explained by the suggestion that in the absence of agglutinins and anti-phosphatase, brucella antigen adds to the normally present phosphatase activity.—S. J. GILBERT.

STILES, G. W. (1945.) *Brucellosis in goats. Recovery of Brucella melitensis from cheese manufactured from unpasteurized goats' milk.*—*Rocky Mtn med. J.* 42. 18-25. [Abst. from abst. in *Biol. Abstr. Sect. F.* 19. No. 5. 28.] 2448

The testing of 14,339 blood samples from 131 herds of goats, in the Cooperative Bang's Disease Laboratory (Denver) of the U.S. Bureau of Animal Industry, revealed 8.5% reactors, with titres of 1:25 or higher.

*Br. melitensis* was isolated from g. pigs injected with goat cheese prepared from unpasteurized goats' milk. Eight out of 19 cheese samples produced brucellosis. Four of these samples were of the feta type, made from raw goats' milk; three were of the romano variety, made from unpasteurized goats' milk, and one was an imported yellow cream cheese made from cows' milk. The probable ages of the eight cheeses ranged from 38 days to a year. Of six additional samples of Colorado goat cheese of the romano (incannestrato) type tested later, two, 64 and 70 days old respectively, caused brucellosis upon injection into g. pigs.

Through the co-operation of the Colorado State Health Department, the Colorado State Board of the Livestock Commission, the U.S. Public Health Service, the Food and Drug Administration, and the Bureau of Animal Industry, much progress in the control of brucellosis has been noted during the year's investigation. Sanitary conditions have improved on goat ranches and in cheese plants, reacting goats have been destroyed and newly acquired animals have been tested before entry into clean herds.

MACLENNAN, J. D., & MACFARLANE, R. G. (1945.) *Toxin and antitoxin studies of gas-gangrene in man.*—*Lancet.* 249. 301-305. 2449

In an investigation covering 33 cases of human infection with *Clostridium welchii*, the possibility of using the lecitho-vitellin test as a specific diagnostic test for this condition was excluded. In contrast to their previous attempts with experimental animals, the authors did not succeed in demonstrating the lecithinase activity of *alpha* toxin from samples of wound exudate or affected muscle extracts taken *ante-mortem*. In only one case could the toxin be demonstrated by its lecithinase activity. This may have been due to the non-specific fixation of the toxin by the tissues and possibly also to its neutralization by the circulating antitoxin.

The concentration of antitoxin in the circulation and tissues at varying times after the intravenous and intramuscular inoculation of antitoxin in normal volunteers and in patients with gas gangrene was also

investigated. Antitoxin was shown to be present in much greater amounts in exudate and dead muscle tissue than in normal muscle.

In nine cases in which the affected muscle could not all be removed at the time of operation, an excess of antitoxin in the blood stream for anything up to 92 hours before death failed to prevent a fatal termination to the disease. It seemed that the circulating antitoxin was incapable of arresting the local spread of the gangrene from affected tissues.

The possibility that the profound toxæmia of gas gangrene is not due solely or even primarily to *alpha* toxin is discussed. It is conceivable that the tissue breakdown products may be more the cause of death than is the direct action of the bacterial toxin.

—R. R. A. COOMBS.

ZAMECNIK, P. C., FOLCH, J., & BREWSTER, L. (1945.) *Protection of animals against Cl. welchii (Type A) toxin by injection of certain purified lipoids.*—*Proc. Soc. exp. Biol., N.Y.* 60. 33-39. 2450

Purified total lipoids obtained from erythrocytes, plasma and liver were found to inhibit the haemolytic action of *Clostridium welchii* toxin *in vitro*. They were also found to have a protective effect against the toxin in mice and dogs, without apparently suppressing the immune antitoxin response. The protective properties resided in the acetone-insoluble, alcohol-soluble fraction of the lipoids (lecithin fraction).

The protection appeared to be due to a "substrate partition effect" in which the lecithinase of the toxin hydrolyses the added lecithin; provided a sufficiently high concentration of added lecithin was present, the destruction of the body cells due to the hydrolytic action of the toxin on their lecithin content was prevented.—R. R. A. COOMBS.

HODOSY, J. (1944.) *[Streptococcosis in young geese and ducks.]—Allatoro. Lapok.* p. 37. [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 259.] 2451

*Streptococcus viridans* was isolated from young geese and ducklings which had eaten fermented food and sand with resultant damage to the intestinal mucosa. A young goose, subcutaneously injected with the isolated strain, died after an illness of 24 hours, after an incubation period of 12 days. At autopsy a streptococcus resembling the inoculated strain was recovered.—J. ZWEIF.

EVENSON, A., MCCOY, E., GEYER, B. R., & ELVEHJEM, C. A. (1946.) *The cecal flora of white rats on a purified diet and its modification by succinylsulphathiazole.*—*J. Bact.* 51. 513-521. [Authors' summary copied verbatim.] 2452

In a study of the cecal flora of albino rats on the purified diet of Black *et al.*, the largest group counted was found to be the lactobacilli. The coliform group was also present in important numbers and included in large proportion coliform species other than true *E. coli*. Enterococci and yeastlike organisms were less numerous than either the lactobacilli or the coliform bacteria. "Total" counts always exceeded the sum of the group counts, indicating the presence of types, perhaps bacteroides, for which no group count method is yet available.

The feeding of a diet containing 0.5 per cent succinylsulphathiazole depressed the coliform and the lactobacillus groups. The former, although more sharply affected, showed a tendency toward re-establishment; the latter showed a slower alteration in numbers but a more permanent one. The reduction in numbers of these two groups was in part compensated by the increase in numbers of enterococci and yeastlike forms.

ZAMENHOF, S. (1946.) *Studies on bacterial mutability:*



The time of appearance of the mutant in *Escherichia coli*.—*J. Bact.* 51. 351-361. [Author's summary copied verbatim.] 2453

This study deals with the problem of the well-known but hitherto unexplained delay in the occurrence of bacterial mutants. To eliminate part of this delay, namely, the delay in the production of a medium preferential for the mutant, the work was done on citrate-unstable strains of *Escherichia coli*, using citrated media, which are always strongly preferential for the citrate-fermenting mutant. To make possible quantitative study, the experiments were performed on a large number of Koser broth cultures. The following facts were established:

(1) Given an adequate number of mother cells there is no delay in the occurrence of the first mutant cell. The mutant may occur as early as within 10 hours after inoculation, that is, among young and normal cells. In that respect, these bacterial mutations may resemble mutations in higher organisms.

(2) The reason for the delay in the detection of this mutant cell has been found in the slow multiplication of the mutant and its early descendants in the mother culture. This slowness may be caused by poisoning by an inhibitory factor produced by the mother cells. If the mutant cells are transferred into a fresh medium, they multiply rapidly after a short lag period. Similar but less accentuated delay due to poisoning has been found in the normal citrate-positive cells if they are inoculated into 12-hour-old, or older, citrate negative cultures.

(3) One pure mother strain may give rise to entire gamuts of mutants differing in the degree of citrate utilization, and probably also in the degree of their resistance to inhibitory factors.

NUTINI, L. G., Sr., KELLY, T. A., & McDOWELL, M. A. (1946.) Effect of *Staphylococcus aureus* extracts on various bacteria.—*J. Bact.* 51. 533-538. [Authors' summary copied verbatim.] 2454

See also absts. 2496 (staphylococci), 2603-2605, 2662 (TB), 2660 (TB. in zebus), 2662 (John's disease), 2493, 2606 (pasteurella), 2664 (tularemia), 2594 (pseudomonas), 2636-2638 (salmonella), 2658, 2661 (brucella immunization), 2608 (ringworm), 2505 (predatory fungi), 2659 (epizootic lymphangitis), 2589-2599 (antibiotics), 2458 (action of radiations on bacteria), 2485-2487 (bacteriophage), 2649-2651, 2654 (technique).

## DISEASES CAUSED BY PROTOZOAN PARASITES

LUCAS, A. (1944.) Modes de l'infestation naturelle et prévention dans les coccidioses. [Natural infection and methods of prevention of coccidiosis].—*Rec. Méd. vét.* 120. 123-124. 2456

The successful development of the oocysts of coccidia depends on available oxygen, suitable temperature and the presence of moisture. Dryness [as is well known] quickly destroys oocysts. Recommendations are made as to means of prevention of avian coccidiosis, viz, the frequency with which litter should be changed, the duration of viability of oocysts in manure heaps, and the advisability of keeping the older, and probably more resistant, birds on pastures.—C. HORTON SMITH.

STAVITSKY, A. B. (1945.) Studies on the pathogenesis of leptospirosis.—*J. infect. Dis.* 76. 179-192. [Author's summary slightly amended.] 2457

Experiments on the rate of spread and distribution of *Leptospira icterohaemorrhagiae* in the tissues of the guinea pig and hamster after entrance into the host by various routes are described and discussed. The spirochetes rapidly invaded the blood after injection by most peripheral routes. Moreover, they were not localized at the site of intradermal injection, apparently escaping from that area before the various factors of localization could come into play. Attempts to demonstrate "spreading factor" in filtrates and autolysates of

Several protein-free alcoholic extracts of a virulent strain of *Staphylococcus aureus* cells and of filtrable bacterial products in the media in which they were grown were prepared. The effects of these and simple filtrates on the growth of *Staphylococcus aureus*, *Escherichia coli*, *Shigella dysenteriae*, and *Aerobacter aerogenes* were investigated.

Extracts of both cells and the media in which they were grown, while showing some slight differences, were predominantly inhibitory in their growth effects on the test organisms. Cell-free filtrates of media in which *Staphylococcus aureus* was grown were, in general, stimulatory in their action on the growth of the test organisms.

Ultraviolet irradiation of *Staphylococcus aureus* slightly modified the action of both the broth extract and the filtrates.

There was a reversal of the growth response of the test organisms with higher concentrations of the cell extract (2 instances) and filtrates of the 48-hour ultraviolet irradiated cultures of *Staphylococcus aureus* (1 instance).

Biochemical tests indicate that in some cases the alcoholic broth extract may interfere with the coagulase reactions of the bacteria in culture.

HALE, J. H., & SMITH, W. (1945.) The influence of coagulase on the phagocytosis of staphylococci.—*Brit. J. exp. Path.* 26. 209-216. 2455

In *in vitro* experiments the authors showed that phagocytosis of coagulase-positive organisms was greatly reduced by the presence of coagulable plasma. The phagocytosis of coagulase-negative organisms was unaltered under similar conditions. It is suggested that the inhibitory mechanism is due to the production of a fibrin film at the surface of the organism due to the action of coagulase on fibrinogen.

The significance of this inhibition of phagocytosis in the initiation and development of staphylococcal lesions is discussed.—R. R. A. COOMBS.

leptospiral cultures were unsuccessful, suggesting that it is the rapid motility of the organisms themselves which is responsible for their rapid spread through tissues. The selective localization of the spirochetes in certain organs, particularly liver, adrenals, and kidneys, is apparently correlated with their ability to multiply in these and not in other organs. However, leptospiras were present in the bone marrow without evidence for multiplication there. Culture of the marrow might, therefore, prove a means of early diagnosis, if it can be shown that the organisms localize there in the natural disease in man and animals.

The eye seems to be the organ most sensitive to leptospirosis in guinea pigs. Intraocular injection of small numbers of organisms usually caused the death of the guinea pig. Therefore, intraocular inoculation of guinea pigs with materials suspected of containing even small numbers of leptospiras may be a satisfactory method of early diagnosis of the natural disease.

The organisms did not reach the brain or spinal fluid from the blood while they could usually be identified in the blood after injection into the brain in guinea pigs. Reasons for this apparent discrepancy are presented, including the possible relation of the electrokinetic potential of the spirochetes to the impermeability of the blood-brain and blood-cerebrospinal fluid barriers to them. An extensive meningitis was produced

in guinea pigs and hamsters by injection of leptospiras into the cerebrum or into the subdural space. On the other hand, no histological alterations were observed in the cerebrum after such inoculations.

Attempts to develop a "meningotropic" strain of *Leptospira* by repeated subdural passage in guinea pigs were unsuccessful.

Past evidence for the existence of increased meningeal permeability in leptospirosis is reviewed and supplemented by new findings. Attempts artificially to alter the permeability of the meninges to peripherally injected spirochetes were unsuccessful. The mode of development of leptospiral meningitis in man, and the host and parasite factors possibly influencing the pathogenesis of this condition are discussed.

See also absts. 2512 (recent advances), 2513 (*Trypanosoma venezuelense*), 2609-2611 (therapy of trypanosomiasis).

## DISEASES CAUSED BY VIRUSES AND RICKETTSIA

LEA, D. E. (1946.) The action of radiations on viruses and bacteria.—*Brit. med. Bull.* 4. 24-26. 2458

L. reviews the action of gamma, X and alpha rays and discusses the chemical effects of radiation and the possible mechanism of the action of radiations on viruses and bacteria. Direct and indirect actions of radiation are discussed [see also *V. B.* 15. 326]. The differentiation of the larger viruses, e.g., vaccinia virus, into radio-sensitive and radio-insensitive constituents is referred to in connexion with the suggestion that such radio-sensitive portions are identifiable with the genes of a single-celled organism [see *V. B.* 12. 585]. The use of radiation inactivation had already been suggested for estimating the size of the smaller viruses, assuming that their particles were large nucleoprotein molecules and that each particle or "macromolecule" could be inactivated by each ionization produced [see *V. B.* 18. 207 and 15. 326]. Reference is made to work by LEA & SALAMAN [in press, *Proc. roy. Soc. Ser. B.*] in which an attempt has been made to do this with S-13 bacteriophage, the particle diameter being estimated at 15.5, 15.9 and 16.0 m $\mu$  by radiation with gamma, X and alpha rays respectively. [The size as determined by ultrafiltration analysis is 8-12 m $\mu$  (see *V. B.* 3. 242) and by centrifugation analysis is 15-17 m $\mu$  (see *V. B.* 7. 381).] L. concludes that the agreement between previous estimates and this latest estimate of size by radiation inactivation is convincing proof that the S-13 bacteriophage particle must, in fact, be a single molecule.

A brief reference is made to the action of radiations on bacteria [see *V. B.* 8. 249].—W. M. HENDERSON.

MICHALSEN, E., & MIKKELSEN, K. (1945.) Typeaendring af Mund- og Klovesyggevirus. [Change of type of foot and mouth disease virus.]—*Maanedsskr. Dyrlaeger.* 57. 160-170. 2459

In the course of laboratory work with F. & M. disease virus the authors obtained evidence of virus type mutations brought about by desiccation. Desiccation *in vacuo* of frozen virus is often carried out and it is well known that freezing never alters the virus type; the drying operation is, therefore, thought to have accounted for the following unexpected occurrences, which could only be explained by the theory that mutation had occurred.

G. pigs infected with a virus of bovine origin proved to be immune on reinfection with the same virus, but others reinfected with the same virus, which had been dried, were not immune and contracted the infection with generalization. On retest against bovine A virus they proved to be immune. The assumption is that desiccation had changed the virus from O to A type.

Attempts to demonstrate toxin production by leptospiras were unsuccessful.

Evidence was presented to show that, as a method of diagnosis, culture was superior to direct dark-field examination or to microscopic examination of stained smears and sections. Intraperitoneal injection of test materials into young guinea pigs, when used, was second only to culture in effectiveness of detection of the presence of the spirochetes.

The hamster reacts to infection with *L. icterohaemorrhagiae* in a manner at present indistinguishable from the response of the guinea pig to this infection. Therefore, this species is as suitable as the guinea pig for experimental studies of this disease or for its diagnosis.

Unexpected behaviour was also observed with three samples of g. pig A viruses of different origin. G. pigs previously infected with natural A virus were immune to reinfection with the same virus desiccated. Retest with O type virus was followed by the usual non-immune reaction, so that the dried virus had not in this case become mutated to O type, but had lost its A nature. In a supplementary experiment g. pigs were infected simultaneously with four strains of virus, bovine O, g. pig O, bovine A and g. pig A, and when subsequently retested with the same dried virus they were not immune to it.

Finally, g. pigs were vaccinated with a formalized A virus and reacted on test to O virus: five out of ten of these reacted further to the same dried virus.

This phenomenon is of much scientific interest and has some practical importance as it indicates there is a risk, believed to be slight, of mutation in virus subjected to freeze-drying. The possibility of virus mutation must be borne in mind in laboratory work and errors due to it must be guarded against.—J. E.

FLÜCKIGER, G. (1943.) Das eidgenössische Vakzine-Institut in Basel. [The Federal Vaccine Institute, Basle.] pp. 48. Berne: Hans Huber. 8vo. 2460

This booklet describes the methods used in the Institute in the preparation of foot and mouth disease vaccine, and the history of its inception. The design and layout of the buildings are particularly aimed at preventing the accidental spread of the live virus from the premises. Methods of inoculation and slaughter, collection of the virus, disposal of the carcasses and excrement, disinfection of personnel, and the preparation and testing of the vaccine in use at the Institute are explained.

—R. A. ROPER.

PARKER, R. C., & HOLLENDER, A. J. (1945.) Propagation of rabies virus in tissue culture.—*Proc. Soc. exp. Biol.*, N.Y. 60. 94-98. 2461

Twelve series of culture experiments were made to test the effect of various modifications of technique. One strain of virus was maintained for 57 passages in cultures of chopped mouse embryo brain suspended in rabbit serum and buffered salt solutions. In one instance the virus was found to multiply as readily in cultures prepared from the brains of five-day-old mice as in cultures prepared from embryo mice. Comparative tests showed that no real advantage was gained by continuous gassing of the cultures with mixtures of oxygen, carbon dioxide and nitrogen, provided the buffering system of the medium kept the pH at the optimal level. Attempts to cultivate the virus in chick embryo brain cultures were unsuccessful.—W. M. HENDERSON.



- KNIGHT, C. A. (1946.) Precipitin reactions of highly purified influenza viruses and related materials.—*J. exp. Med.* 83. 281-294. [Author's summary copied *verbatim*.] 2462
- Antisera to purified PR8 virus, to purified protein from normal allantoic fluid, and to purified normal mouse lung particles were obtained from hyper-immunized rabbits and used in quantitative precipitin tests employing various purified preparations of influenza virus and related materials as antigens. The results of those tests indicated that the most highly purified preparations of PR8 or of Lee influenza virus obtained from infectious allantoic fluid contain an antigen characteristic of normal allantoic fluid and likewise that highly purified mouse lung PR8 virus contains an antigen characteristic of normal mouse lungs. Since the infectivity of virus preparations which were ultracentrifugally and electrochemically homogeneous was precipitated by the appropriate antisera to normal antigens, it was concluded that the normal antigens constitute a part of the 100 m $\mu$  particles with which influenza virus activity is at present deemed to be associated. It was estimated from quantitative precipitin data that the most highly purified preparations of PR8 and of Lee influenza viruses obtained from infectious allantoic fluid contain at least about 20 and 30 per cent, respectively, of an antigenic structure characteristic of the sedimentable protein of normal allantoic fluid.
- WIENER, M., HENLE, W., & HENLE, G. (1946.) Studies on the complement fixation antigens of influenza viruses Types A and B.—*J. exp. Med.* 83. 259-279. [Authors' summary copied *verbatim*.] 2463
- Two types of specific particles can be obtained from allantoic fluid preparations of influenza A and B virus. The larger particle which possesses all the attributes of the virus and which shows a sedimentation constant of about 600 S was compared with the smaller component (30 S) by complement fixation technic.
- The 30 S component can be differentiated from the 600 S particle by the patterns of the optimal antigen-antibody relationships and by cross-absorption of the sera with the two particles.
- Some of the 30 S-type antigen can be demonstrated in higher concentrations of the 600 S particles by the use of sera containing only anti-30 S; i.e., sera carefully absorbed with 600 S component. Also, upon sonic vibration of the 600 S particle, serologically active material was released which behaved in every respect like the 30 S antigen.
- The response of human beings to these antigens was found to vary. Antibodies to the 30 S component developed in the majority of subjects exposed to active virus either under epidemic or experimental conditions, but only rarely following vaccination with three different vaccines.
- In selecting sera without 30 S antibodies a fairly close correlation between the antibody titers obtained by inhibition of hemagglutination and complement fixation with the 600 S component was obtained. The presence of 30 S anti-bodies prevented such a correlation.
- The reaction with the 30 S antigen may be of value in the diagnosis and study of the epidemiology of influenza.
- HIRST, G. K. (1945.) Direct isolation of influenza virus in chick embryo.—*Proc. Soc. exp. Biol., N.Y.* 58. 155-157. 2464
- The primary isolation of influenza virus in the developing hen's egg is readily achieved by inoculation of bacteria-free material into the amniotic sac of 13-day-old chick embryos [see *V.B.* 12. 24] and by detection of the virus in the amniotic fluids through the use of haemagglutinins [see *V.B.* 14. 120]. When throat washings are used, contaminating bacteria must be removed; H. reports the successful use for this purpose of 125 units of penicillin per ml. of broth throat washing. The inoculation of penicillin and throat washings into the amniotic sac proved to be the most sensitive method of isolating virus.—W. M. HENDERSON.
- DONALDSON, P., & CLARK, P. F. (1945.) Colloidion particle adsorption of equine encephalomyelitis virus.—*Proc. Soc. exp. Biol., N.Y.* 58. 185-188. 2465
- Using a strain of Western E.E. virus the authors were unable to obtain specific agglutination of colloidion particles with antiserum owing, in their opinion, to insufficient adsorption of the virus upon the colloidion particles.—W. M. HENDERSON.
- LENNETTE, E. H., & KOPROWSKI, H. (1945.) Serologic distinctness of eastern, western, and Venezuelan equine encephalomyelitis viruses.—*Proc. Soc. exp. Biol., N.Y.* 60. 110-114. 2466
- Cross-neutralization tests of the three virus strains were performed with mouse brain material and with immune sera prepared in rabbits. Undiluted serum was added to tenfold dilutions of virus and 0.03 ml. of the mixture inoculated subcutaneously into three-day-old mice. From these tests there was no evidence that the viruses possessed any antigenic components in common. The authors point to the desirability of studying the specificity of cross-immunity tests, as these have occasionally shown some evidence of relationship between the three viruses.—W. M. HENDERSON.
- KUBES, V., & GALLIA, F. (1944.) Neutralización del virus encefalomielítico equino tipo Venezuela por sueros humanos. [Neutralization of the Venezuelan equine encephalomyelitis virus by human sera].—*Bol. Inst. Invest. vet., Caracas.* 2. No. 6. 179-195. [English summary.] 2467
- Laboratory workers who had been accustomed to handling material from E.E. cases, or dead E.E. vaccine, all had high neutralization titres to the virus. None of the workers was known to have been infected clinically and it is considered that some of them may have passed through a subclinical infection, since the majority had been affected at some time with influenzal symptoms, such as muscular pains and headache. Somnolence was reported in one case.
- There is, of course, the possibility that serum antibodies were acquired as a result of much handling of infective material. This view is supported by the case of the man who was handling dead vaccine only, and was never in contact with live virus, as far as could be ascertained.
- The Venezuelan virus seems to be highly infective to man by direct contact, but the illness caused is much milder than that produced by the Western and Eastern types of virus. Serum antibodies persist over several years, to a high titre.—ISOBEL W. JENNINGS.
- \*VON BUZA, L. (1944.) [Contagious septicaemic (haemorrhagic) encephalomyelitis of horses in Hungary].—*Allatorv. Lapok.* 67. No. 6. [Abst. from abst. in *Tierarztl. Z.* No. 2. p. 29. (1944).] 2468
- The author succeeded for the first time in producing an encephalitis in g. pigs after subcutaneous inoculation of brain material from a diseased horse. The experiments established the infective nature of this disease.—R. A. ROFER.
- WESTERFIELD, C., & DIMOCK, W. W. (1946.) The pathology of equine virus abortion.—*J. Amer. vet. med. Ass.* 109. 101-111. 2469
- A brief account of the history and manifestations of the disease is given and the macroscopic and micro-

scopic changes in the foetus are described in detail. Acidophilic intranuclear inclusion bodies (illustrated in drawings of various tissues) are found at the periphery of the focal necrotic areas in the liver, in the epithelium of the interlobular bile ducts, in the endothelium, smooth muscle cells, and fibroblasts of the blood vessels, in the liver capsule, in the epithelium of the air-passages and, in a few cases, in the spleen, thymus, lymph nodes and Peyer's patches. The demonstration and appearance of these bodies are described in detail.—E. COTCHIN.

FARQUHARSON, J. (1946.) Malignant catarrhal fever. —*Vet. J.* 102. 127-130. 2470

The possibility that cattle contract malignant catarrh from sheep is discussed, since clinical evidence has been collected that there is a much higher incidence of the disease where cattle and sheep are herded together. F. recognized [in Colorado, U.S.A.] only the peracute form of the disease but the morbidity was relatively low and mortality rarely exceeded 1%. Clinical symptoms and P.M. findings are described. No satisfactory method of treatment has been found.—R. E. GLOVER.

HARBOUR, H. E., & JAMIESON, S. (1946.) Jaagziekte in Scotland.—*Vet. Rec.* 58. 6. 2471

The diagnosis of *jaagziekte* (epizootic pulmonary adenomatosis) in two flocks is recorded. The symptoms and pathology were typical. In each flock the disease had apparently been present but unrecognized for a number of years. The annual loss had been 6-8 ewes in a flock of approximately 300 ewes in Berwickshire and 10-15 in a flock of approximately 240 ewes in Aberdeenshire. The period of visible illness before death was about three months.

The nature of the disease may not be recognized by the owner. The authors suggest that the disease may be more widespread in Great Britain than is generally supposed.—M. C.

SELBIE, F. R. (1946.) The lesions of sheep dermatitis virus infection in the rabbit and guinea-pig with particular reference to the tumour viruses.—*J. Path. Bact.* 58. 199-206. [Author's summary copied verbatim.] 2472

The histology of rabbit and guinea-pig lesions produced by a virus derived from an outbreak of sheep dermatitis [contagious ecthyma] is described.

The characteristic feature of the lesions in the rabbit is an excessive hyperplasia of the hair sheaths, which form large papillomatous outgrowths, whereas in the guinea-pig the lesions are of a degenerative type similar to vaccinia.

The significance of the difference in the response of these animals to the virus is discussed with particular reference to the tumour viruses.

SHAHAN, M. S. (1946.) Effect of temperature, phenol, and crystal violet on vesicular stomatitis virus.—*Amer. J. vet. Res.* 7. 27-31. 2473

The M strain of New Jersey type virus was used to determine the effect of the procedures involved in the preparation of biological products from blood and serum. Four separate heating tests were carried out, in each of which saline suspensions of triturated foot pads from infected g. pigs were heated to 55°, 58° and 60°C. for 30 min. in Berkefeld- or Mandler-filtered serum. In the first two tests serum from a pig susceptible to swine fever was used, while in the other two tests equine and bovine sera and serum from an S.F.-immune pig were used. Of the 45 g. pigs used to test the survival of the virus only one (injected with material which had been heated to 55°C.) developed vesicular stomatitis lesions and these were only about half as well marked as in the controls.

The effect of refrigeration, incubation, phenoliza-

tion and addition of crystal violet was investigated by adding one part of saline suspension of infected pads to eight parts of S.F. virus (defibrinated blood) which was then divided into six portions, two of which were treated with crystal violet as in the preparation of S.F. vaccine; two portions were treated with phenol (0.5%) and the remaining two portions were left without preservative. One portion of each pair was incubated at 37.5°C. and the other refrigerated at 3°-5°C., samples being taken at intervals for g. pig tests.

In none of the incubated samples was the vesicular stomatitis virus infective after 5-8 days, the crystal violet preparation being non-infective after 2-3 days. The virus remained infective in the refrigerated unpreserved portion for 40 days but was non-infective on the 52nd and 54th days. In three refrigerated phenolized preparations the virus remained infective for 11, 17 and 23 days respectively, while in the refrigerated crystal violet preparation the virus was inactivated in less than 17 days.

The incubated and refrigerated crystal violet and incubated phenolized preparations were found to be non-infective to S.F.-immune pigs after they had become non-infective to g. pigs.—H. S. McTAGGART.

ANDREWS, C. H., & GLOVER, R. E. (1945.) Grey lung virus: an agent pathogenic for mice and other rodents.—*Brit. J. exp. Path.* 26. 379-387. 2474

This virus disease produces chronic and characteristic lesions in the lungs of mice and other rodents. The virus was isolated independently by the two authors from a case of infantile diarrhoea and during passage of material from a case of calf pneumonia respectively. The agent may have arisen by activation of a latent virus in the stock mice. It is strictly pneumotropic and readily maintained in mice by intranasal passage of lung at intervals of ten days or longer. Infection by contact is irregular, periods of many weeks' contact being necessary before infection of recipient mice is at all frequent. In rats and hamsters lesions were rare, but virus could frequently be recovered in fairly high concentration. In the vole, virus titres were low. In cotton rats, the virus appeared to be more lethal than in mice; survivors developed the chronic disease in the same way as mice.

The pulmonary lesions in mice develop from isolated areas of greyish-red consolidation three days after intranasal inoculation. The characteristic "grey lung" appearance is best seen after 14 days or later, when the lungs are voluminous, with no tendency to collapse when the thorax is opened. They have a wet, greyish-red appearance and are markedly oedematous. In spite of the severe appearance of the lesions, the mortality is low. A remarkable feature is that the lesions do not regress, even after as long as six months. Further, the virus persists in the lungs in titres up to  $10^{-6}$  for up to seven and a half months.

Histologically, the lesions are of interstitial pneumonia, with cuffing of the blood vessels and bronchioles with large mononuclear cells. There is no evidence of fibrotic contraction of the lung as a whole, in contrast to infection with influenza virus. Neither active immunity nor the presence of antibodies has been demonstrated.

The virus is differentiated from Nigg's [V.B. 15. 78] mouse pneumonitis virus by its smaller size (filtrable through a  $0.45\mu$  Gradocol membrane), by its non-susceptibility to sulphonamides and by its not giving rise to the characteristic elementary bodies of that disease. From pneumonia virus of mice [PVM of HORSFALL & HAHN—V.B. 11. 522], grey lung virus differs in its low mortality rate and in its greater stability in suspension at room temperature (24 as compared with two



hours). It is not inactivated with PVM serum and does not agglutinate mouse red cells. The possible relation of the grey lung virus to pleuropneumonia-like organisms is discussed.—J. B. BROOKSBY.

ALICE, F. J. (1945.) *Ocorrência em camandongos cinzentos "Mus musculus" de um vírus que se assemelha ao da coriomeningite linfocitária.* (Nota prévia). [Virus resembling that of lymphocytic choriomeningitis found in *Mus musculus*.]—*Brasil-med.* 59. 224-225. [Abst. in *Bull. Hyg., Lond.* 21. 65, copied verbatim. Signed: H. HAROLD SCOTT.] 2475

The author in the course of an examination of the tissues of *Mus musculus* in the laboratory isolated therefrom a virus. To study this he took groups of 15 of these animals, removed the brains, livers and spleens, emulsified these organs and injected guinea pigs with the emulsion intracranially and intraperitoneally at the same time. Two of the inoculated animals showed a rise of temperature. Their brains were removed, emulsified and inoculated into more guinea-pigs. These last reacted with fever, emaciated rapidly and died in 12-14 days. The chief autopsy findings were those of pneumonia. A virus was isolated which was designated SP4. Inoculation of this intracranially was followed after an incubation period of 5-6 days by symptoms of tachypnoea, arching of the spine and convulsions. [This is called an incubation period but a rise of temperature occurred 24 hours after the inoculation.] The temperature fell to subnormal a day or two before death, which took place on the 9th to 11th day. Wasting and weakness were very marked, salivation and conjunctivitis were common, but there was no paralysis.

Infection could be conveyed by several routes: cranial, peritoneal, subcutaneously, intradermally and muscularly. Rabbits and cats were not found to be susceptible. The virus when tested was found to be closely allied to that of choriomeningitis. The serum of guinea pigs which recovered was found to contain antibodies to the laboratory strain of choriomeningitis virus and, *vice versa*, the serum of guinea pigs recovered from the laboratory choriomeningitis strain neutralized, partly, at least, the virus isolated from these mice.

BURNET, F. M., BEVERIDGE, W. I. B., McEWIN, J., & BOAKE, W. C. (1945.) *Studies on the Hirst haemagglutination reaction with influenza and Newcastle disease viruses.*—*Aust. J. exp. Biol. med. Sci.* 23. 177-192. 2476

This is a collection of observations on the haemagglutination phenomenon first described by HIRST [V. B. 12. 379]. The observations are recorded under five headings:—(I) Partial dissociation of haemagglutinin and infective activity of Newcastle disease virus. (II) Experiments on the elution of Newcastle disease virus and influenza virus from fowl cells. (III) The process of virus neutralization as observed by the Hirst haemagglutination method. (IV) The action of human tears on influenza virus. (V) Agglutination of pigeon erythrocytes by influenza virus A in, the O phase.—L. HART.

WEINECK, E. (1943.) *Ueber Desaggregationen des Hühnerpestvirus.* [Dispersal of fowl plague virus.]—*Kolloidztschr.* 103. 159-161. [Abst. from abst. in *Bull. Inst. Pasteur.* 42. 136.] 2477

Previously (1942) W. showed that vaccinia virus could be dispersed by whipping the suspension to a foam. Fowl plague virus could not be dispersed in this way. The addition of urea (1-5%), bovine serum, glycerin or aspartic acid (1%) had no effect on suspensions of the virus, but the addition of sarcosine (0.5%) raised the

titre of a suspension from  $10^{-4}$  to  $10^{-6}$  and the addition of glycine (1%) raised the titre to  $10^{-6}$ . W. concludes that the addition of the amino acids split the aggregates of fowl plague virus into smaller units.—J. B. BROOKSBY.

FINDLAY, G. M., MARTIN, N. H., & MITCHELL, J. B. (1944.) *Hepatitis after yellow fever inoculation. Relation to infective hepatitis. I. Clinical and pathological findings. II. Immunology and epidemiology.*—*Lancet.* 247. 301-307, 340-344 & 365-370. 2478

I. The clinical symptoms were analysed in an outbreak of hepatitis which followed the use of icterogenic yellow fever vaccine in West Africa between September, 1942, and July, 1943. The latent period varied from 26 to 239 days, with an average of 101.5 days. Among 689 patients there was only one fatal case, the lesions found at autopsy being subacute hepatic necrosis. All of 432 patients whose symptoms were exhaustively analysed had icterus; all severe and moderate and some mild cases had liver enlargement. No marked changes occurred in the blood picture.

In one battalion of European officers and men, all inoculated at the same time, there were a number of cases of hepatitis with no jaundice in addition to the typical cases with jaundice and bile in the urine.

II. Evidence is presented in support of the view that infective hepatitis and the hepatitis which follows icterogenic yellow fever vaccine are due to the same or closely related agents. The main difference clinically is the longer latent period of the post-inoculation hepatitis and this may be accounted for by the route of inoculation; probably infective hepatitis is normally transmitted by droplet infection and then has an incubation period of about 20-40 days, whereas after subcutaneous injection the incubation period varies from 30 days to six months.

Possible examples are reported of spread of post-inoculation jaundice to contacts who had not been inoculated and evidence is presented which suggests that a previous attack of infective hepatitis gives some measure of protection against post-inoculation jaundice. By means of a complement-fixation test it was shown that the agents responsible for the two diseases are antigenically related. Attempts to transmit post-inoculation jaundice to various species of animals were unsuccessful. Transmission to human volunteers, using the blood or faeces of icteric patients, did not succeed, but the authors have already reported successful transmission by intranasal inoculation with nose washings of pre-icteric or very early icteric patients [see V. B. 14. 10].—E. G. WHITE.

ODIN, M. (1945.) *Bidrag till frågan om uppkomsten av inokulationshepatit.* [On the question of inoculation hepatitis.]—*Nord. Med.* 25. 581-584. [English summary.] [Abst. in *Bull. Hyg., Lond.* 20. 719-720, slightly amended.] 2479

Infective jaundice, often serious, is not infrequent in subjects treated 2-8 months earlier in hospitals. One hundred and forty-six cases of this kind have been observed at this hospital during the years 1937-1944. The infection takes place, most probably, in the process of collecting blood samples (for the determination of haemoglobin or blood-sugar, etc.) through the inoculation of very small quantities of blood protein or serum protein adhering to the instrument used. The icterogenic protein comes from patients not suffering from icterus. The use of concentrated alcohol for cleaning and disinfection of the instruments is inadvisable, as the alcohol will precipitate the protein and to a certain extent attach it to the instrument.

Jaundice by inoculation may be prevented by careful cleaning of the instrument with, for instance,

3 per cent. D10 solution [a preparation supplied by the firm of Wilh. Becker of Stockholm] consisting of soap together with certain disinfectants. A still better method is boiling the instruments used for blood-taking. Repeated boiling, however, spoils the instruments and is very time-wasting.

Early in the year 1942 strict instructions were introduced concerning careful cleaning and disinfection of the instruments for bloodtaking and especially substituting as disinfective medium 3 per cent. D10 solution for concentrated alcohol. These measures gave the following result. In the course of the last three years jaundice has been observed only in one case who had been treated in the hospital the previous year. In the three-year period 1939-1941 the number was not less than 40 cases.

\*HERZBERG, K. (1943.) Der Kanarienvogel als Versuchstier in der Hepatitis contagiosa-Forschung. [The canary as experimental medium in research on infective hepatitis.]—*Klin. Wschr.* pp. 676-677. [Abst. from abst. in *Bull. Inst. Pasteur* 42. 145.] 2480

Canaries were inoculated intramuscularly with blood or urine from seven cases of infective hepatitis. The disease can be transmitted from canary to canary by inoculation of sterile filtrates and four serial passages have been made.—J. B. BROOKSBY.

FABER, H. K., & SILVERBERG, R. J. (1946.) A neuropathological study of acute human poliomyelitis with special reference to the initial lesion and to various potential portals of entry.—*J. exp. Med.* 83. 329-354. [Authors' summary and conclusions copied verbatim.] 2481

The peripheral and central nervous tissues of eight patients dying of acute poliomyelitis were examined histologically to discover whether and to what extent the distribution of lesions was consistent with the hypothesis that virus enters the mucous membranes through the superficial nerve fibers, infects the neurons in peripheral ganglia, and proceeds thence into the central nervous system to infect connecting centers. Evidence consistent with this hypothesis was found in all cases. Based on concurrent lesions in the primary and secondary centers, the frequency of involvement of the various systems and the probability of their having acted as primary pathways for entering infection may be summarized as follows:—(a) Trigeminal afferent system (V cranial): very frequent. (b) Visceral afferent system (IX and X cranial): fairly common but less than V. (c) Gustatory system (VII, IX, and X cranial): occasional. (d) Sympathetic system, upper levels (pharynx, bronchial tree, upper esophagus): occasional. (e) Sympathetic system, lower (intestine): occasional or doubtful. (f) Vagal efferent (parasympathetic) system (X cranial) and olfactory (I cranial) system: uninvolved.

In general, the evidence of penetration through the upper alimentary and respiratory tracts was more conspicuous and consistent than through the lower alimentary tract. *The pharynx appears to be an especially favorable site for the primary penetration of virus into the body.*

Our data suggest that the primary lesion of poliomyelitis occurs in the peripheral ganglia.

Primary invasion through the sympathetics results in initial involvement of the central nervous system at the spinal level; invasion through all the other channels described results in initial involvement of the central nervous system at the level of the brainstem (midbrain, pons, medulla). In neither instance does the level of initial involvement necessarily determine the site of initial paralysis.

BENGTSON, I. A. (1946.) A serological study of 87 cases of tsutsugamushi disease (scrub typhus) occurring in Burma and the Philippine Islands.—*Publ. Hlth Rep., Wash.* 61. 887-894. [Author's summary copied verbatim.] 2482

A serological study by complement fixation, of 37 cases of tsutsugamushi disease occurring in Burma and the Philippine Islands revealed a variety of antigenic responses to the three strains of tsutsugamushi used in the tests, namely the Gilliam, Karp, and Seerangayee strains. Certain cases were predominantly of the Gilliam type, others of the Karp or Seerangayee type, and the serums of a number of cases responded equally well to all three types. Cross fixation occurred in practically all cases. The results obtained as a whole do not indicate any clear differentiation of serological types. The Karp and Gilliam strains appear sufficiently distinctive, however, to warrant the use of these two in the testing of serums from cases of suspected tsutsugamushi illness. Weil-Felix titers with OXK antigen were much lower than complement-fixing titers with rickettsial antigens and persisted for a shorter time.

BENGTSON, I. A. (1946.) Complement fixation in tsutsugamushi disease (scrub typhus).—*Publ. Hlth Rep., Wash.* 61. 895-900. [Author's summary copied verbatim.] 2483

A complement-fixation test for the Karp strain of tsutsugamushi (scrub typhus) has been developed. It appears to be specific as far as tested for the disease, and shows good agreement with the results of the Weil-Felix tests with OXK antigen.

PELLEGRINI, D. (1942-45.) Primi casi di idropericardite infettiva dei ruminanti in Somalia. [First record of infectious heartwater in ruminants in Somaliland.]—*Racc. Stud. Pat. vet., Somaliland*. No. 1. pp. 5-11. [English summary.] 2484

Although heartwater has been recorded in imported sheep in Abyssinia it has not been encountered in local animals, and there is no record of its occurrence in Italian Somaliland. Conditions in a native goat and three karakul sheep in Somaliland, diagnosed from the clinical symptoms and pathological lesions as heartwater, are now described, but *Rickettsia ruminantium* was not demonstrated microscopically. The disease could be transmitted by blood inoculation to goats and karakul sheep, but not to native sheep or to a calf. From native accounts it is thought that the disease occurs throughout Somaliland, being most prevalent in the dry season. Specimens of *Amblyomma hebraeum* were found on only one animal, *Rhipicephalus pulchellus* being the most prevalent tick species.—U. F. RICHARDSON.

HOFER, A. W., & RICHARDS, O. W. (1945.) Observation of bacteriophage through a light microscope.—*Science*. 101. 466-468. 2485

The authors describe the lysis of *Rhizobium leguminosarum* by bacteriophage as observed by four methods, viz, (1) treatment with auramin and observation under ultraviolet light, (2) and (3) stain techniques with ordinary light and (4) phase difference microscopy of BENNET (1944) and RICHARDS (1944). Details of the methods are to be described in a later paper, but the advantages of phase difference microscopy are stressed.

Similar observations were made by all four methods, the sequence of events involving one or more of the following:—(1) loss of motility of bacterial cells, (2) clumping of cells, as in agglutination, (3) development of a blue colour in the cells apparently as a result of a change in the refractive index, (4) a tendency of the cells to assume a vertical rather than a horizontal position, (5) attachment of the phage particle to the



cell by a gradually shortening stalk, followed by increase in size of the particle and rupture of the cell, the particle becoming obscured by released protoplasm, (6) development within the cell of large refractile bodies, (7) appearance in the suspension of lysed bacteria of many white masses of cell protoplasm each containing highly refractile bodies, (8) almost complete invisibility of lysed cells as they tend to become scattered in the suspension, (9) instead of the above changes, grotesque shaping of many cells, great development in size and sudden apparent disappearance: such cells are not associated with particles of the ordinary phage shape, (10) occasional large bodies which appear to consist of cell protoplasm containing small blue bodies arranged in a form suggestive of chromatin. The various stages are illustrated by diagrams.—H. S. McTAGGART.

NICOLLE, P. (1943.) Appréciation de la taille des corpuscules bactériophages par leur sensibilité au frottement. [Determination of the size of bacteriophage particles by their sensitivity to friction.]—*Ann. Inst. Pasteur*. 69. 116-121. 2486

Every bacteriophage is thermosensitive, photosensitive and radiosensitive and N. shows that these properties are related to the size of corpuscles in each bacteriophage. Assessment of these characteristics not only enables identification to be carried out, but also allows their size to be determined with accuracy.

The sensitivity to friction of the Twort staphylococcus phage was estimated by repeated tests. N. showed that in order to titrate a bacteriophage filtrate by the method of counting the particles, one drop of the dilution to be titrated must be mixed with a drop of suspension of sensitive bacteria and the mixture spread by means of a glass pipette drawn out at one end and bent to a right angle. In the case of the Twort staphylococcus bacteriophage, the longer the spreading process was continued, the greater the reduction in the number of particles from the original; the sensitivity of this

bacteriophage was so great that the use of a spreader caused appreciable errors in testing. Other bacteriophages also showed this sensitivity to friction and it was evident that a relationship existed between their sensitivity and the size of their corpuscles. Of seven bacteriophages tested for periods of 10 min., the least affected appeared to be that of the dysentery bacillus, measuring 10-20 m $\mu$ , whereas the phage of *B. subtilis* measuring 70 m $\mu$  showed the greatest sensitivity.

—J. C. BUXTON.

\*BORDET, J., & BORDET, P. (1941.) Degrés correspondants de virulence chez les bactériophages et de réceptivité chez les microbes. [Relationships of virulence of bacteriophage and the susceptibility of the corresponding bacteria.]—*Bull. Acad. Belg. Cl. Sci.* 6. 484. [Abst. from abst. in *Bull. Inst. Pasteur*. 42. 32.] 2487

From experiments made with two strains of bacteriophage on rough and smooth variants of *Bacterium coli*, the authors postulate that a remarkable correspondence tends to be established between the virulence of a bacteriophage and the sensitivity of the susceptible bacteria. The strains of bacteriophage used were a "strong" strain which lysed both R and S strains of *Bact. coli* and a "weak" strain which lysed neither strain and which could be propagated only on the S strain. It is claimed that by repeated passage of the "weak" strain on a mixture of the R and S variants, the "weak" bacteriophage became capable of lysing the R variant. At the same time, the S strain of *Bact. coli* produced as a result of the actions of this "weak" bacteriophage a modified strain called S<sub>2</sub>, which was resistant to the bacteriophage, but by further passage on the S<sub>2</sub> strain the "weak" bacteriophage became virulent for the S<sub>2</sub> strain but not for the S strain. [The origin of the two strains of bacteriophage is not stated and their purity cannot therefore be assumed.]—M. C.

See also abstr. 2508 (Rous sarcoma, Shope papilloma, contagious ecthyma), 2511 (fowl leucosis and sarcoma), 2513 (E.I.A.), 2526, 2527 (effects of maternal infection on foetus), 2612 (E.E.), 2613 (murine and feline pneumonitis), 2619 (dog distemper), 2659, 2660 (rinderpest), 2660 (horse sickness).

## IMMUNITY

EHRRICH, W. E., HARRIS, T. N., & MERTENS, E. (1946.) The absence of antibody in the macrophages during maximum antibody formation.—*J. exp. Med.* 83. 373-381. [Authors' summary copied verbatim.] 2488

Following the injection of dysentery antigen in saline or in saline-in-paraffin-oil emulsion into the pad of the rabbit's hind foot, considerable quantities of antibody were recovered from the popliteal lymph node, while the tissue at the site of injection, containing many granulocytes and numerous macrophages, revealed only insignificant quantities of antibody.

Following the injection of various dysentery and typhoid antigen combinations into the abdominal cavity, no antibody was found in the isolated granulocytes and macrophages of the peritoneal exudate, while the supernatant fluid revealed titers that roughly paralleled those of the blood serum. Similar results were obtained when animals were injected first with antibody intravenously, and subsequently with an unspecific irritant intraperitoneally. The presence of antibody in the supernatant fluid was, therefore, interpreted as being due to secondary concentration (fixation) in an inflamed area.

These findings together with the previously described observations on the lymphocyte seem to show that the macrophage does not synthesize agglutinins against dysentery or typhoid bacilli.

BORW, W. C. (1946.) The effect of high pressures on

hemagglutinating antibodies.—*J. exp. Med.* 83. 401-407. [Author's summary copied verbatim.] 2489

It was found that exposure of hemagglutinating sera to pressures of the order of 3,000 to 4,000 atmospheres destroyed their agglutinating power, but did not convert them to inhibiting ("blocking") antibodies. Higher pressures (4,500 to 5,500 atmospheres) were required to destroy inhibiting anti-Rh<sub>0</sub> antibodies in a "blocking" serum. This conforms with ideas already held that the "blocking" antibodies are significantly more stable than the agglutinating antibodies.

DOUGHERTY, T. F., CHASE, J. H., & WHITE, A. (1945.) Pituitary-adrenal cortical control of antibody release from lymphocytes. An explanation of the anamnestic response.—*Proc. Soc. exp. Biol., N.Y.* 58. 135-140. 2490

The anamnestic reaction is the term applied to the increase in the antibody content of the blood which occurs following the injection of a variety of non-specific substances other than the original antigen. The antibodies are believed to be released from lymphocytes which contain immune bodies. Such a reaction can be produced in rabbits and mice following a single injection of adrenal cortical extract or pituitary adrenotropic extract, but not by desoxycortone acetate. Two toxic stimuli, benzene and potassium arsenite, liberated antibodies from lymphocytes in intact but not in

adrenalectomized mice. The data support the view that the pituitary-adrenal cortical secretion is a controlling mechanism for the release of antibodies from lymphocytes.—J. M. ROBSON.

CAMPBELL, D. H., & McCASLAND, G. M. (1944.) In vitro anaphylactic response to polyhaptenic and monohaptenic simple antigens.—*J. Immunol.* 49, 315-320. 2491

In vitro anaphylactic experiments were carried out using isolated strips of g. pig intestinal smooth muscle actively and passively sensitized with ovalbumin-*p*-(*p*-azophenylazo)-phenyl-arsonic acid. Anaphylactic responses were obtained with homologous multivalent haptens, the various compounds being listed. (Two of the multivalent haptens investigated failed to cause a visible reaction.) Homologous univalent haptens did not as a rule produce a response although one univalent hapten, having a relatively large molecular size, produced a weak and delayed anaphylactic response, despite the fact that it did not elicit a visible precipitation reaction with the antiserum in question. In discussing the weak anaphylactic reaction with this univalent hapten, the authors suggest that the hapten may have polymerized and thus become multivalent. Another possibility seems to be that weak but effective multivalence was brought about by some weak cross-reaction occurring between another group or groups on the azo-dye molecule and the homologous azo-protein antibody. Although the univalent haptens were unable to produce an anaphylactic response, they were capable of inhibiting a subsequent response of the sensitized muscle preparation to multivalent haptens, even when the muscle strips were well washed between the two exposures.

—R. R. A. COOMBS.

ROTHEN, A. (1945.) Forces involved in the reaction between antigen and antibody molecules.—*Science.* 102, 446-447. 2492

R. continued his work on the demonstration of the reaction between a surface molecular film of an antigen adsorbed on stainless steel slides and a solution of the specific antibody by observing the increase in thickness of the adsorbed film.

It was found, unexpectedly, that the increase in thickness of the film caused by the reaction with specific antibody increased with the number of underlying layers of adsorbed bovine albumin antigen. This was not the case when egg albumin was used as the antigen.

It was also shown that if before exposing the adsorbed antigen layers to the homologous antiserum, 2-10 layers of either stearic acid or protein were "non-specifically" adsorbed, in order to cover or screen the antigen layers, a specific reaction still took place on addition of homologous antiserum, despite the presence of the intervening screen.

The possible interpretation of these results is discussed. It is suggested that the effective range of action between a film of antigen and an antibody molecule may extend to an order of hundreds of Å instead of a few Å, as in the case of forces between individual atoms. It would thus seem that there may be a specific interaction between a film of antigen and homologous antibody without there being direct contact, such as might take place through a thin biological membrane.

—R. R. A. COOMBS.

BHATTNAGAR, S. S., & SHRIVASTAVA, D. L. (1946.) An experimental study on cellular immunity in *Pasteurella pestis* infection.—*J. Hyg., Camb.* 44, 307-313. [Authors' summary slightly amended.] 2493

1. Animals susceptible and naturally immune to plague—Bombay rats and white mice—were infected with *Past. pestis* and supravital study of white blood cells

from the peripheral blood stream was carried out. Similar studies were made on white mice injected with (a) pure envelope serum, (b) pure somatic serum and (c) whole antip plague serum.

2. Different experimental conditions produced different cell pictures with different behaviours of individual cell types, especially the polymorphonuclears, the monocytes and the clasmatocytes. These abnormalities were found to bear distinctive relationship to (a) active immunity, (b) passive immunity and (c) susceptibility on the part of the experimental animal.

3. The value of immunological inferences from this study in relation to plague-serum therapy and plague prophylaxis has been emphasized.

4. The possibility of a better understanding of host-parasite relationships from similar studies in other bacterial infections has been pointed out.

BRUUN, E. (1941.) The histopathology of the allergic skin reactions.—*Acta path. microbiol. scand.* 18, 558-580. [In English.] 2494

In many cases of human eczema a patch test with a suitable antigen evokes cellular changes in the dermis which are exactly comparable with the natural disease. Twenty patients allergic to various compounds were tested intracutaneously with specific antigens and portions of the reacting skin, removed under local anaesthesia, were examined histologically 24-48 hours later.

In addition to non-specific changes, such as stasis, oedema, etc., a cellular infiltration was seen which was chiefly composed of lymphocytes and histiocytes. B. stresses the absence of polymorphonuclears and claims that the presence of these is a clear indication of some secondary phenomenon, such as necrosis or bacterial invasion. The appearance of large numbers of eosinophiles in various types of skin reaction is discussed and the opinion expressed that eosinophilia is by no means a specific sign of allergy.—R. E. GLOVER.

ABRAMSON, H. A., BOYD, W. C., HOOKER, S. B., PORTER, P. M., & PURNELL, M. A. (1945.) The specificity of the second stage of bacterial agglutination and hemagglutination.—*J. Bact.* 50, 15-22. 2495

Results are detailed of experiments on mixed agglutination. By using mixtures of normal and partly haemolysed ("ghost") human r.b.c.'s of various blood groups, together with human isoagglutinins and with rabbit antisera (adsorbed to render them specific), it was found that when the normal and "ghost" cells did not have a common antigenic receptor the individual clumps were homogeneous, but that when they did have a common antigenic receptor, then mixed clumps (i.e., containing both normal and "ghost" cells) were formed. Even when pre-agglutinated normal and "ghost" cells were mixed, heterogeneous aggregates were often observed.

By using mixtures of readily distinguishable micro-organisms (*Salmonella typhi* with streptococci or *Haemophilus pertussis* with streptococci), together with mixtures of their corresponding antisera, it was found that the aggregates tended to be predominantly homogeneous, particularly when the antibody was dilute, but that when the antibody was concentrated, a greater proportion of heterogeneous aggregates was formed. When the organisms were agglutinated by lowering the concentration of electrolyte present, so that no serologically specific forces were involved, not all the clumps were mixed.

The results suggest not only that the "alteration" hypothesis plays a role, but also that non-specific forces may be effective under certain circumstances.

—H. S. McTAGGART.



LOMINSKI, I., & ROBERTS, G. B. S. (1946.) A substance in human serum inhibiting staphylocoagulase.—*J. Path. Bact.* 58. 187-197. [Authors' summary copied *verbatim*.] 2496

1. A substance specifically inhibiting the clotting of plasma by staphylocoagulase was found in human sera; it acts by neutralising coagulase and not by rendering plasma non-coagulable. A technique for its quantitative estimation is described.

2. The inhibitory substance was found in 212 out of 348 sera; its incidence in healthy people appears to be higher than among patients suffering from severe staphylococcal infections. No attempt was made, however, to correlate closely clinical with serological findings.

3. The inhibitory substance is precipitated by ammonium sulphate with the globulin fraction of serum proteins and is relatively heatstable, resisting 63°C. for 30 minutes.

4. It is different from Quick's albumin X, which inhibits thrombin clotting of plasma.

5. Neutralisation of coagulase by the inhibitory substance requires time, but neutralisation does not progress indefinitely with increase of time. The coagulase-inhibitory substance relation conforms to the rule of multiple proportions. The reaction is, in part at least, reversible.

6. The inhibitory substance has antibody characteristics but cannot yet be definitely accepted as such.

SAPIRSTEIN, L. A., REED, R. K., & PAGE, E. W. (1946.) The site of angiotonin destruction.—*J. exp. Med.* 83. 425-439. [Authors' summary and conclusions slightly amended.] 2497

Theoretical considerations render it unlikely that the greatest part of the angiotonase found in the body is available for the destruction of angiotonin. *A priori* considerations support the view that only plasma angiotonase is involved in angiotonin destruction *in vivo*.

We have utilized the magnitude and duration of the pressor response to angiotonin as an index of available angiotonase, and we have found that: (a) Nephrectomy and evisceration are without marked effect on angiotonin response. (b) Hemorrhage and hemodilution without shock cause a striking increase in the response to angiotonin and this appears to be due to removal of the plasma rather than the cells. Shock developing after hemorrhage results in a state of refractoriness to angiotonin. (c) Intact red cells *in vitro* have no destructive action on angiotonin, but after hemolysis they have several hundred times the activity of plasma. (d) Intravascular hemolysis, whether produced *in vitro* or *in vivo*, decreases the response to angiotonin to a degree which is consistent with the hypothesis that the normal animal destroys angiotonin entirely in its plasma. The active principle in hemolyzed blood is destroyed by heating to 65-70°C. for 15 minutes.

These findings support the hypothesis that all or at least the greatest part of angiotonin destruction under physiological circumstances occurs in the plasma, and the significance of this hypothesis is discussed.

BASU, P. N., & ROY, R. N. (1946.) The incidence of natural diphtheria antitoxin in horses: its influence on the results of antigenic stimulus.—*J. Hyg., Camb.* 44. 348-349. [Authors' summary copied *verbatim*.] 2498

1. Out of 221 horses tested 34.8% showed natural diphtheria antitoxin to the extent of 0.02 unit or more per c.c. of serum.

2. Amongst the horses in which no natural circulating antitoxin was detected, a much larger number failed to respond to stimulus than amongst those having circulating antitoxin. But, amongst the animals that did show appreciable response to primary stimulus, there was not much difference in degree of response between the horses with and those without natural circulating antitoxin.

See also absts. 2426 (antigens of *B. anthracis*), 2437 (of *Erysipelothrix*), 2445, 2446 (of *S. pullorum*), 2656 (of rickettsia), 2449, 2450 (clostridial toxins), 2447, 2458 (brucella immunity and immunization), 2438, 2430, 2431 (BCG), 2438 (immunization against *Psat. bubalipetice* and swine fever), 2510 (against virus tumours), 2503 (trichina immunity), 2464 (Risi polvaccine), 2616, 2617 (allergy, anaphylaxis), 2455 (phagocytosis), 2462, 2463 (precipitins, complement fixation in influenza), 2483 (c.-f. test for rickettsia), 2465 (collodion aggl. of E.E. virus), 2476 (Hirst haemagglutination).

## PARASITES IN RELATION TO DISEASE [ARTHROPODS]

THEILER, G. (1943.) Notes on the ticks off domestic stock from Portuguese East Africa. pp. 55. Lourenço Marques, Mozambique: Imprensa Nacional de Moçambique. [In English.] 2499

A collection of ticks from Portuguese East Africa was sent to the Veterinary Research Laboratory, Onderstepoort, for identification. The ticks identified were *Amblyomma hebraeum*, *A. variegatum*, *Hyalomma impressum transiens*, *H. impressum rufipes*, *Haemaphysalis leachi*, *Rhipicephalus appendiculatus*, *R. capensis*, *R. evertsi*, *R. sanguineus*, *R. simus*, *R. falcatus*, *Boophilus (Palpobophilus) decoloratus*, *B. (Uroboophilus) fallax* and *Argas persicus*.

*Ixodes pilosus*, *Rhipicephalus bursa*, *Ornithodoros moubata* and *O. savignyi*, *Hyalomma zambesianum*, *H. planum* and *H. lewisi*, *Rhipicephalus duttoni* and *R. tricuspidatus* were not present in the collection, although they have been recorded in this area by other authors.

A detailed description is given of each species in the collection, with excellent drawings.—G. B. S. H.

LEES, A. D. (1946.) The water balance in *Ixodes ricinus* L. and certain other species of ticks.—*Parasitology*. 37. 1-20. 2500

The effect of relative humidity and saturation deficiency on the water balance of *I. ricinus* was esti-

mated by weighing ticks before and after exposure to controlled conditions. Experiments indicated that the exchange of water took place through the cuticle and not through the spiracles.

The unfed tick gains water from humid air or water in contact with the cuticle and loses it by evaporation. Whilst attached, the tick gains water from ingested blood and loses water in the excrement. The engorged tick usually lacks the ability to take up water from the air. Water loss from unfed ticks is not closely related to saturation deficiency, particularly at high humidities, owing to the ability to secrete water. A state of equilibrium is reached at a relative humidity of about 92%. Near the point of equilibrium the loss or gain of water over a wide range of temperatures is governed by the relative humidity. Both unfed and engorged ticks possess the ability to limit temporarily the entry of water in contact with the cuticle. About two-thirds of the water ingested by an engorged female is eliminated before the end of engorgement and this may be due to evaporation, as at high temperatures there is a marked increase in the permeability of the epicuticular lipid. Ticks vary in their powers of limiting evaporation and this may reflect differences in the epicuticular lipid. The descending order of resistance is *Ornithodoros moubata*, *Dermacentor andersoni*.

soni, *D. reticulatus*, *Rhipicephalus sanguineus*, *Amblyomma maculatum*, *Ixodes canisuga*, *I. hexagonus* and *I. ricinus*.—U. F. RICHARDSON.

— (1945.) Informe de un año de lucha contra la sarna ovina y caprina. (Agosto de 1944 a julio 1945). [Campaign against mange of sheep and goats, August 1944 to July 1945.]—*Bol. tec. Direcc. gen. Ganad., B. Aires*. No. 12, pp. 5-12. 2501

Strict measures have been taken in Argentina to rid sheep and goats of parasitic mange. At the beginning of the official campaign in 1941 the disease was widespread; over 50 million sheep and about 3,000,000 goats were affected in 1942 and the annual economic loss was estimated at 500 million pesos. Compulsory orders for control were at first applied to Tierra del Fuego, Santa Cruz (southern region) and Entre Rios, and extensive districts of these, with an enormous animal population, are now claimed to be practically free of the disease.

On July 10, 1944, a decree was passed making the extermination of mange compulsory throughout Argen-

See also absts. 2440 (vectors of tularaemia), 2512 (of *Leishmania donovani*), 2580-2582, 2614 (D.D.T.), 2662 (sarcoptic mange in cattle).

### PARASITES IN RELATION TO DISEASE [HELMINTHS]

GOULD, S. E. (1945.) Trichinosis: a major health problem in the United States. What shall be done about it?—*Bull. N.Y. Acad. Med.* 21. 616-624. 2502

This is an authoritative general article on the history, mode of spread, symptoms, diagnosis, treatment and prevention of trichinosis, especially with regard to the present position in the U.S.A., which is stated to have the greatest trichinosis problem of any country in the world. After considering control by the methods of microscopic inspection of pork and by cooking kitchen waste before feeding it to pigs, G. concludes that the most reliable control under U.S.A. conditions would be by the "processing" of all pork and pork products [i.e., all pork should be cooked or, alternatively, subjected to freezing or suitable pickling procedures for a period of time sufficient to kill all trichinae]. The "processing" should be carried on under Federal or state supervision, and the finished product as offered for sale should bear a label stating that the product conforms to the Federal (or State) regulations for "processing" of pork. G. considers that the responsibility for the wholesomeness of pork as food belongs properly to the meat packer and manufacturer and that the public would soon learn to demand that all pork offered for sale should be safe for human consumption. —E. S.

MATOFF, K. (1943.) Altersimmunität und parenteral erzeugte Muskeltrichinellose beim Hunde. [Age immunity and parenterally produced muscle trichinosis in the dog.]—*Zbl. Bakt. I. (Orig.)* 150. 328-336. 2503

An attempt was made to discover the seat of immunity in adult dogs to trichinosis. Gravid female trichinae or mature larvae were introduced parenterally into a series of dogs and larvae were afterwards isolated in large numbers from the various predilection sites. Examinations of dogs 21-144 days after injection showed no signs of the degeneration of any muscle trichinae.

The evidence contradicted the theory of DE JONG (1911), suggesting that muscle trichinae underwent rapid degeneration and absorption in the dog, and indicates that the mechanism of immunity interrupts the worm's life-cycle before the larvae reach the blood stream from the intestine.—R. A. ROPER.

tina, and the present report describes the progress and results of the first year's work under the decree.

The plan of campaign comprised (a) propaganda and education, (b) inspection of flocks in transit, with penalties for non-compliance with orders, (c) inspection and treatment of livestock establishments, with similar penalties. The main line of attack was (b) and during the year 55,681 flocks (over 20 million animals) were inspected, nearly 44,000 of the flocks being in transit to the main meat markets. Mange was confirmed in 1,311 herds in transit.

In livestock establishments, of which 18,550 were inspected during the year, 60 days were allowed for cleansing before penalties were imposed.

The campaign of the year under review was regarded as preparatory, and in many districts the work resulted in a reduction of the degree of infestation of sheep farms estimated at 50-80%.

The high degree of organization and cooperation required and maintained between veterinary and other interests is outlined.—K. J. SINCLAIR.

SCHNELLE, G. B., ROBY, T. O., YOUNG, R. M., & JONES, T. C. (1945.) Canine filariasis: a study of 100 cases.—*N. Amer. Vet.* 28. 155-164. 2504

A detailed survey of 100 cases of *Dirofilaria immitis* infection in war dogs is described. Diagnosis was made by the detection of parasites in the serum, in conjunction with a general physical examination of the dog, which included a urine analysis for evidence of nephritis or cystitis.

Seventeen dogs with advanced symptoms of cardiac disease or nephritis were destroyed without treatment.

Treatment consisted of the use of foudadin (sodium pyrotechin disulphonate of sodium) which was administered by intravenous or intramuscular injection in doses ranging from 0.5-2.5 ml. repeated periodically until the blood was free of microfilariae.

Evidence of toxicity occurred in 35 dogs, two of which died. Toxic symptoms were manifested by haematuria, keratitis, pulmonary congestion, and oedema.

In 81 cases microfilariae were cleared from the blood stream in 11-41 days.—D. W. JOLLY.

DESCHIENS, R. (1941.) Innocuité des hyphomycètes prédateurs de nématodes pour la végétation des pâturages et pour le bétail. [Fungi which destroy nematodes are not toxic to stock and do not damage pastures.]—*C. R. Soc. Biol. Paris* 135. 830-832. 2505

D. carried out an experiment to test the effect of certain fungal predators of nematode larvae upon pasture herbage and upon animals grazing on the herbage. He used two similar, adjacent, swampy grass plots each 10 metres square, upon one of which were placed in June, 1939, mixed cultures of *Arthrobotys oligospora*, *Dactylella bembicoides* and *Dactylaria ellipsospora* at the rate of about 4,000 mixed spores per square metre. Two yearling lambs were grazed upon each of these pastures for 60 days during June and July. Examination of the herbage of the pasture which had been inoculated with fungus spores showed that the fungi had formed sheaths and networks over the plant stems, which would be suitable for the protection of grazing animals against strongyle larvae. After eight days the fungi had



sporulated and had therefore become resistant to desiccation. In periods of dryness the fungi disappeared from the surface of the herbage and penetrated the depths of the soil. In wet periods, they multiplied vigorously in the pools and the mire, the network formed by *Arthrobotrys oligospora* reaching a length of 10 cm. in water whilst that of *Dactylella bembicodes* and *D. ellipsoidea* did not reach 5 cm. All three species were still present two months after they were first placed on the pasture. At the end of two months there was no difference in the amount of herbage in the two pastures and a similar state of affairs prevailed one month after the animals had been removed. A year after the beginning of the experiment there was no difference quantitatively or qualitatively between the two pastures.

See also abstr. 2615 (taeniaceae), 2652 (floatation technique).

### SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

VUILLAUME, R. (1945.) Le théorie chimique du cancer. [Causation of cancer. The chemical theory.] —*Rec. Méd. vét.* 121. 257-270. 2506

A brief review of knowledge of the causation of cancer, with special reference to its experimental production with carcinogenic hydrocarbons. Theories as to natural causation are briefly mentioned, and the author attempts to correlate these theories with the known experimental facts.—J. G. CAMPBELL.

BITTNER, J. J., & HUSEBY, R. A. (1946.) Relationship of the inherited susceptibility and the inherited hormonal influence in the development of mammary cancer in mice.—*Cancer Res.* 6. 235-239. [Authors' conclusions copied verbatim.] 2507

During the course of this study mammary tumours were not found in any of the descendants of the fostered females of the cancerous A and Z (C3H) stocks and their reciprocal hybrids, mice that were susceptible to mammary cancer but did not have the milk agent.

Observations obtained on breeding females of the cancerous A and Z stocks and their reciprocal F<sub>1</sub> and F<sub>2</sub> hybrids were in accord with the theory that the mice of these 2 strains may have the same inherited susceptibility to mammary cancer.

The difference in the incidence of mammary cancer in the virgin females of the A and Z strains was due to gene action in controlling some hormonal mechanism. This effect has been called the inherited hormonal influence, and is probably the result of the action of multiple genes.

The same genes probably do not produce the inherited susceptibility and the inherited hormonal influence.

The characteristics (concentration and/or activity) of the milk agent may differ in mice of the A and Z stocks and influence the incidence of mammary cancer that was observed in the hybrids when they were maintained as virgins. These differences were not apparent in the breeding hybrids.

Each inciting influence in the genesis of mammary cancer in mice may be nearly completely determining in its effects, and thus equally important.

GREAT BRITAIN. (1945.) Twenty-second annual report of the British Empire Cancer Campaign, 1945. pp. 102. London: British Empire Cancer Campaign. 4to. Items of veterinary interest pp. 12-14, 53-55 & 70. 2508

This report covers a very wide field. The following are among the investigations dealing with tumours in animals.

The two lambs grazed on the pasture infected with fungi were also given drinking water containing these organisms and showed no ill-effects as a result. They did not exhibit any dislike of the herbage contaminated with fungi and gained weight at the normal rate. Cultures of these fungi were added to the food of two rabbits for two months and they showed no difference in growth rate or general state of health from two control rabbits.

It is concluded that these fungal predators of nematode larvae exercise no deleterious effect upon the herbage of pastures, or upon animals grazing upon infected pastures. They could, therefore, be safely used in the control of nematode infestation in animals by reducing the number of infective larvae on the pastures. [See also V. B. 13. 74, 133 & 431.]—T. E. G.

The right breast of fowls was injected with a solution of proflavine and both breasts were injected three days later with the Rous sarcoma virus. Large round cells of Rous tumour type were found in both breasts from the fourth or fifth day, but the typical spindle cells of the Rous tumour developed from the sixth day in the breast treated with proflavine and not until the ninth day in the untreated breast. This suggests that proflavine accelerated differentiation of the round cells to spindle cells and the establishment of growing tumours.

The application of 9:10-dimethyl-1:2-benzanthracene to the skin of rabbits caused complete or partial inhibition of Shope papilloma and "rabbit dermatitis" virus lesions; croton oil accelerated or intensified the lesions. Infection of the rabbit's skin with both viruses usually resulted in inhibition of the lesions caused by one of them (virus interference). ["Rabbit dermatitis" virus is a strain of the virus of sheep dermatitis (= contagious ecthyma) developed by passage in rabbits.]

The inoculation of "rabbit dermatitis" virus in the scarified skin of rats and mice caused no visible reaction, but was followed by a mild infection characterized by hyperplasia of the epidermis and by parakeratosis. Successive passages diminished the virulence of the virus further, but it could still be demonstrated by passage back to rabbits. This adjustment of the virus to the rat epithelial cells approaches a perfect symbiosis in which the virus multiplies without damaging the host cell.

Although the virus-induced and chemically induced fowl tumours are all of mesoblastic type and are mostly composed of spindle cells it is possible to differentiate histologically between the two types. Virus-induced tumours could not be cured by radiotherapy.

Attempts to demonstrate carcinogens in heated fats and in human liver were not successful. Feeding diazo-aminobenzene to Wistar rats produced gastric papilloma; the mechanism was found to be by interference with vitamin A metabolism and possibly also by a direct action on the gastric epithelium. Administration of various azo-dyes to rats and mice, coupled with dietary restrictions, caused a wide range of lesions, inflammatory, degenerative and neoplastic.

The report, like previous issues, gives a valuable summary of the work carried out at many centres and includes reference to numerous important articles recently published.—E. G. WHITE.

CAMPBELL, J. G. (1945.) Neoplastic disease of the fowl with special reference to its history, incidence

and seasonal variations.—*J. comp. Path.* 55. 308-321. 2509

C. describes the incidence of neoplasms in fowls submitted for autopsy to the Department of Poultry Diseases, Royal (Dick) Veterinary College during the five year period 1939-44. Neoplastic disease was encountered in 386 (18.7%) of 2,063 fowls examined.

The incidence of neoplasms was greatest (38.8%) in the Buff Rock breed and lowest (10.3%) in White Wyandottes. No cases of erythro- or myeloid leucaemia were encountered in White Wyandottes or Light Sussex fowls.

The maximum incidence of neoplasms appeared to be in the spring months. This was tentatively ascribed to increased sexual hormone activity causing stimulation of latent pre-neoplastic cells.

C. distinguishes between "fowl paralysis tumour" (visceral lymphoid tumours occurring in fowls affected with neurolymphomatosis) and lymphoblastoma (visceral lymphoid tumours occurring in the absence of neurolymphomatosis) and suggests that the data indicate a possible aetiological difference between these two conditions. Tumours composed of lymphoid cells accounted for over 44% of all tumours encountered.

—F. D. ASPLIN.

OLSON, C., Jr. (1945.) Immunization against a lymphoid tumor of the chicken I. Attenuation by freezing.—*Cornell Vet.* 35. 221-230. 2510

O. describes attempts to attenuate a transplantable lymphoid tumour, in order to obtain material suitable for investigating its immunizing properties, by freezing minced tumour continuously for varying intervals, by freezing ground pulp continuously, and by freezing minced tumour with occasional interruption by thawing.

See also abstract 2466 (tumours caused by viruses).

## DISEASES, GENERAL

WENYON, C. M. (1945.) Presidential address. Tropical medicine in war and peace.—*Trans. R. Soc. trop. Med. Hyg.* 39. 177-194. 2512

Advances made in tropical medicine during the war are reviewed. Among the subjects dealt with are the control of malaria by atabrin and the increased knowledge of the life-history of the malarial parasite following upon the work done with *Plasmodium gallinaceum*, the malarial parasite of fowls; the development of new insecticides such as D.D.T. and gammexane; scrub typhus and the development of formalized vaccines; the treatment of bacillary dysentery by sulphaguanidine and of amoebic dysentery by penicillin combined with one of the sulphonamides; the final proof of the transmission of *Leishmania donovani* by the sandfly *Phlebotomus argentipes*, and the demonstration by Russian workers that a rodent reservoir of leishmania infection existed in the gerbil, *Rhombomys opimus*.

The facilities available in Great Britain for the study of tropical diseases compared unfavourably with those which have been developed in the U.S.A. and an urgent plea is made for improvement.—M. C.

KUBES, V. (1944.) Campaña contra la derrengadera y peste boba del ganado caballar en los llanos de Venezuela. (Tres primeros informes sobre sus causas, presentados en los años 1937-38). [*Trypanosoma venezuelense* infection and infectious anaemia of horses in Venezuela.] pp. 27. Caracas: Instituto de Investigaciones Veterinarias. 8vo. 2nd impression. 2513

Before 1937, it was thought that "derrengadera" and "peste boba" were both manifestations of *T. vene-*

The growth capacity of the lymphoid tumour pulp was more readily destroyed than the immunizing ability; interrupted freezing and thawing was more injurious to both capacity for growth and the immunizing ability. Tumours derived from different donors required different degrees of attenuation to render the growth innocuous while retaining the ability to immunize. Some of the experiments indicate that the resistant state is only achieved after the inoculum has been resident in the host for 7-8 days.—J. G. CAMPBELL.

GOTTSCHALK, R. G. (1946.) Factors influencing the stability of a filtrable agent of chicken leukosis and sarcoma.—*Cancer Res.* 6. 270-277. [Author's summary copied verbatim.] 2511

A filtrable agent of leukosis and sarcoma of chickens (agent 13) was sedimented from tumor extracts at a speed of 15,000 r.p.m. in an angle centrifuge. When resuspended and diluted in buffer the sediments contained only a small fraction of the infectivity of the original extracts. The total activity was recovered when the sediments were kept in concentrated solution, or resuspended and diluted in buffer containing inactivated rabbit serum. A preparation of agent 13 purified by 3 successive centrifugations at 15,000 r.p.m. was infectious in amounts containing  $8.6 \times 10^{-6}$  mgm. of nitrogen. The 50 per cent response dose (calculated from latent period values) contained  $3.2 \times 10^{-7}$  mgm. of nitrogen.

Inactivated supernatants of extracts from sarcoma 13 did not afford a better protection than solutions of inactivated serum. Inactivated extracts of a non-filtrable chicken tumor (sarcoma 16) had no inhibitory action on agent 13. Thus the protective action of protein solutions appeared to be nonspecific.

zuelense infection in the equine. However, K. appears to have proved that there are in reality two infections, one caused by the trypanosome and the other by the virus of equine infectious anaemia. These two often occur separately, but can occasionally be found attacking a single animal simultaneously. The trypanosome infection ("derrengadera") is susceptible to naganol treatment, but the infectious anaemia ("peste boba") is quite resistant. Occasionally the clinical picture of the virus anaemia resembles that of the protozoan disease and K. found it necessary to study modes of differentiation between the two. For this purpose, red and white cell counts, sedimentation rate, haemoglobin, bilirubin and globulin estimations were carried out, but none of these was helpful in distinguishing between the two diseases.

The work described, which is being continued, was done in the Apura State, but K. believes the infection to be widespread throughout the country, particularly in low-lying districts subject to flooding.—I. W. J.

TER BORG, H. (1941.) Iets over het voorkomen en de behandeling van agalactia bij overigens gezonde primipare merries. [The appearance and treatment of agalactia in mares.]—*Tijdschr. Diergeneesk.* 68. 169-186. [English, French and German summaries.] [English summary slightly amended.] 2514

Six otherwise healthy first-foal Belgian mares were treated for agalactia. The udder was milked and massaged and foals were encouraged to suck as much as possible. Five of the mares received 1-2 injections of 260 I.U. prolactin; one responded rapidly but the others showed no sign of improvement.



The author refers to the work of RIDDLE (1933) who concluded that prolan does not contain a lactotropic factor. He considers that the improvement noted in the one mare was due to the readiness of the udder to secrete upon non-specific stimulation.

GÖBEL, F. (1943.) Zungengrundzyste beim Pferde. [Cysts of the tongue in horses.]—*Z. Veterinärk.* 55. 50-54. 2515

A seven-year-old horse had symptoms of pharyngitis, with difficulty in swallowing liquids, and a discharge of serous fluid mixed with food particles from the nose. Respirations were normal. X-ray examination revealed the presence of a cyst in the midline of the root of the tongue beneath the epiglottis. Recovery followed the removal of the cyst through the mouth by a wire saw under chloral hydrate anaesthesia. In a previous case, the cyst was removed by way of a laryngeal fistula.—E. COTCHIN.

GEBAUER. (1943.) Ein Fall von Aneurysma aortae und Herzmuskelschädigung sowie Betrachtungen über die Frage, ob eine Erkrankung entsprechend der menschlichen Angina pectoris bei Pferden vorkommt. [Aneurysm of the aorta and disease of the heart muscle. Does angina pectoris as seen in man occur in horses?]—*Z. Veterinärk.* 55. 1-10. 2516

A nine-year-old military horse was referred for observation with a diagnosis of "exhaustion and mange". The horse would frequently go down, and at times showed an anxious expression, took little food, moved stiffly and had muscle tremors. Despite the marked symptoms, clinical examination provided merely a suspicion of heart-valve insufficiency. The horse was unlikely to recover and was destroyed; at autopsy marked lesions were found, including adhesions of the aorta to the oesophagus and right lung, numerous myocardial infarcts, a cartilaginous nodule in the aortic wall 2 cm. from the origin of the coronary arteries and, caudally, a large aneurysm of the aorta. There was no thrombosis in the aneurysm and no worm larvae were seen. There was a lack of elastic fibres in the wall of the aneurysm and a short length of the aorta caudal to it and this defect may have been the initial cause of the aneurysm. Subsequent local circulatory and nervous derangements perhaps led to the formation of the myocardial infarcts, which were probably the pathological basis of the horse's illness.

From a consideration of this and of other cases of exhaustion and collapse in horses, it is suggested that there may be a neuro-circulatory coronary dystony present in them that is hardly detectable by clinical examination, thus corresponding to the condition that has been postulated as occurring in angina pectoris of man.—E. COTCHIN.

PALLASKE, G. (1943.) Periarthritis nodosa. [Periarthritis nodosa.]—*Tierärztl. Rdsch.* 49. 8. 2517

P. illustrates by means of two photographs and one photomicrograph a case of periarthritis nodosa in a 13-month-old pig, the heart and kidneys of which were sent to his laboratory with the history that the condition was widespread throughout the carcass.—E. G. WHITE.

CAMERON, G. R., BURGESS, F., & TRENWITH, V. (1946.) An experimental study of some effects of acute anhydraemia.—*J. Path. Bact.* 58. 213-220. [Authors' summary copied verbatim.] 2518

Subcutaneous injection of large amounts of hypertonic glucose or sodium chloride solutions produces severe local oedema, acute anhydraemia, haemoconcentration and circulatory collapse. A temporary disturbance of N metabolism, indicated by a rise of blood non-protein nitrogen in the absence of pronounced renal failure, and a delayed transient anaemia, may follow on

such conditions. Pathological changes resemble those associated with severe thermal burning. It is asserted that many of the disturbances accompanying burning are the result of acute anhydraemia alone.

LEGENDRE, J. M., & CHARY, R. (1944.) Eczéma et troubles ovariens chez la chienne. [Eczema and ovarian disorders in the bitch.]—*Rev. Méd. vét., Lyon et Toulouse.* 95. 268-273. 2519

The authors give references to medical and veterinary literature in which eczema is considered to be associated with disorders of reproduction. They have used oestradiol benzoate in doses of 2,000-5,000 I.U. every two days, supplemented by oral dosage with "ovarian powder", oestradiol benzoate in oil, or ferrous carbonate. No details are given, but it is mentioned that one of the authors [\*LEGENDRE, 1943] has prepared a thesis on the subject.—E. G. WHITE.

GLOVER, R. C. (1945.) Multiple neuritis.—*N. Amer. Vet.* 26. 352-355. 2520

G. describes a syndrome in a nine-year-old Doberman Pinscher bitch which was diagnosed and treated as multiple neuritis, complete recovery ensuing. After being perfectly all right the night before, the dog was next morning unable to stand, with complete extension of the legs and the neck curved dorsolaterally; otherwise it appeared normal. It improved under treatment with "rycimine B" [= ryzamin-B, a vitamin B<sub>1</sub> concentrate prepared from rice polishes by Burroughs and Wellcome] and thiamine chloride but cure was not complete until four months had elapsed. A relapse was observed when vitamin therapy was discontinued for a few days during the treatment, but improvement took place when they were administered again. Marked improvement took place from the seventh week onwards, when large intravenous doses of vitamin B complex were initiated and the relapse was cured by this treatment. [The veracity of the diagnosis is based largely on response to treatment. No mention is made, for instance, as to whether the tentative diagnosis of injury made by the first veterinarian who called in G. as consultant was checked by X-ray examination.]—A. H. HOGG.

DEMONT. (1946.) Contribution clinique à la maladie de la peur chez le chien. [Canine hysteria.]—*Rev. Path. comp.* 48. 58-61. 2521

A large number of cases of hysteria occurred in dogs in Nice during the last three months of 1944 and the outbreak subsided during the spring of the following year. There was no relationship to age, sex or breed, but excitable animals were most often affected, especially those near air-raid sirens or artillery or enduring bombardment. The incidence of the disease seemed to be seasonal and diet did not appear to be a causal factor. Most of the cases were in dogs infested with tapeworms and administration of a vermifuge seemed to reduce the severity of the condition. D. suggests that the condition as it occurred in Nice may have been due to a neurotropic virus which failed to cause a rise in body temperature and affected only animals of a particular temperament and on an inadequate diet.

The symptoms are described in considerable detail and include trembling, fixation of the eyes on a particular object and dilatation of the pupils, howling, a crisis precipitated by sound or bright light and lasting from 1-2 min. up to 10-15 min., defecation and urination at frequent intervals. There were no deaths and although crises were very acute at the beginning of the affection they soon became less acute and finally disappeared.

Treatment consisted in transferring the animals to a dark place, and administering sedatives parenterally and vermifuges. Vitamin B preparations were without effect on the condition.—E. G. WHITE.

BASKETT, R. G., HOUSTON, J., COMMON, R. H., BOLTON, W., & MCCONACHY, S. (1945.) "Six day disease" of chicks.—*Rep. agric. Res. Inst. N. Ireland, 1944-45.* pp. 22-24. 2522

A short summary is given of some further experimental work on six-day disease of chicks. From these results the authors agree with other recent workers that the incidence of the disease is influenced by a number of factors, especially general farm management.—A. B.

DANOWSKI, T. S., WINKLER, A. W., & PETERS, J. P. (1946.) Salt depletion, peripheral vascular collapse, and the treatment of diabetic acidosis.—*Yale J. Biol. Med.* 18. 405-417. [Authors' summary and conclusions copied *verbatim*.] 2523

Circulatory collapse is an important factor contributing to death during diabetic acidosis and coma. The shock is mainly a consequence of a severe salt depletion, which in turn results largely from vomiting. Treatment must include not only restoration of the salt and water deficit but also early and repeated use of colloid solutions. Glucose solutions may aggravate the salt deficit of diabetic coma if they are given subcutaneously. The use of insulin and glucose in the treatment of diabetic acidosis has been discussed.

BRODAL, A. (1946.) Correlated changes in nervous tissues in malformations of the central nervous system.—*J. Anat.* 80. 88-93. [Author's summary and conclusions copied *verbatim*.] 2524

The findings in the brains of a strain of mice affected with a hereditary hydrocephalus are reported. The most prominent change apart from the hydrocephalus was a partial or complete splitting of the cerebellar vermis with lack of the lobulus *c*, except its caudalmost folium. The nuclei sending fibres to the cerebellum were intact. A closely similar human case is also briefly described. In both instances there is reason to assume that the cerebellar anomaly has been produced by an attenuation of the cerebellar plate caused by the hydrocephalus.

From an analysis of normal and hydrocephalic mouse embryos it appears that the hydrocephalus sets in on the 12th day of foetal life, at a stage when the activity of the ponto-bulbar body is just beginning. The separate subdivisions of the inferior olive cannot be recognized until 5 days later, and even at this stage many of its cells are not fully differentiated. The lobulation of the vermis can be recognized approximately one day later.

Based on these findings, the hypothesis is set forth that the lack of correlative changes in the inferior olive (and the pons) can be explained in the following manner: At the time when the neurites from the cells of the olive reach the cerebellum, the malformation is already fully developed (as abnormal embryos from this stage also show). The ingrowing neurites which do not find their normal ending place are directed instead to the remaining intact regions, thus preventing the occurrence of atrophy and changes in the inferior olive, pons and other nuclei.

A mechanism of the type described in this material might give a valid explanation in other instances of malformation, where the usual correlative changes are lacking.

\*STEINIGER, F. (1940-42.) Die erbliche Hasenscharte des Hundes. [Hereditary hare lip in dogs.]—*Arch. Reichsgesundh.Amt.* 74. 399-404. [Abst. from abst. in *Wien. tierärztl. Mschr.* 30. 76.] 2525

S. discusses the origin and possible heredity of harelip in dogs, both of which remain unsolved. It has often been thought that harelip is due to the survival of a cleft normally occurring in any embryo, but the

existence of any such cleft is disputable. S. appeals for the co-operation of dog breeders in observation of its possible hereditary nature.—GERTRUDE HUEHNS.

LONG, J. C., & DANIELSON, R. W. (1945.) Cataract and other congenital defects in infants following rubella in the mother.—*Arch. Ophthalm.* 34. 24-27. [Abst. in *Bull. Hyg., Lond.* 21. 7, slightly amended. Signed: A. JOE.] 2526

These authors add six cases from the United States additional to those already reported from that country and Australia. The mothers had contracted rubella when from two to six weeks pregnant. Three of the babies had bilateral cataract, associated with bilateral microphthalmos, and three showed a unilateral microphthalmos with a distinctive type of cataract in the smaller eye. Lesions were present in the fundus in the three eyes in this series in which the fundus could be seen. All children had cardiac defects, a septal defect being suspected in four. There was one instance each of talipes valgus, cryptorchism, hypospadias, and dacryostenosis. The authors believe that these defects were the result of intra-uterine damage by rubella but ask why this relationship had not been noted prior to 1941. The conjecture is made that the virus of rubella underwent some transformation in Australia and that the new strain was introduced into the United States during the current voluminous traffic between these countries. The authors consider that the gravity of the congenital lesions and the likelihood of their development warrant abortion if rubella occurs in the first third of pregnancy.

BULL, C. (1945.) The effect on the fetus of diseases of the mother during pregnancy.—*Arch. Pediat.* 62. 289-299. [Abst. in *Bull. Hyg., Lond.* 21. 7, copied *verbatim*. Signed: A. JOE.] 2527

Syphilis not only produces death in the foetus or newborn but also produces late manifestations of the disease in over half of the children who survive infancy. Typhoid is said to interrupt pregnancy in 60 to 80 per cent. of cases, the foetus being infected in almost half the cases, "and in contrast to the mother the infection is generally not intestinal". In influenza the pregnancy is spontaneously interrupted in 35 to 60 per cent. of cases, and in pneumonia abortion is said to occur in two-thirds. Smallpox terminates pregnancy in 30 to 69 per cent.; the later the stage of pregnancy, the more likely the abortion. Intra-uterine infection is common and the child may be born pock-marked. The leprosy organism has been found in the placenta and circulating blood of newborn children of leprosy parents but it was difficult to say that the disease was congenital because of the latent period, before symptoms appear, which might permit infection from other sources. Scarlet fever frequently interrupts pregnancy [not in the experience of the abstractor] and whooping cough, although rare in adults, sometimes ruptures the foetal membranes. Anthrax often causes abortion and cases are reported where the disease was transmitted to the foetus. A number of cases of meningococcal meningitis are reported in which the child of the infected mother also contracted the disease. The evidence on the effect of encephalitis in pregnancy is contradictory. Transmission of tuberculosis via the umbilical vein is extremely rare. Rubella in early pregnancy is responsible for the occurrence of congenital cataract and other defects. The consensus has been that malaria is not transmitted *in utero*. Toxoplasmic encephalitis is apparently an example of a disease transmitted to the foetus and affecting the latter much more than the mother. Malnutrition has been long known to affect the foetus. Whilst iodine deficiency does not seem to be a significant



cause of stillbirths in most localities, it would still appear to be serious enough to be worthy of observation in other areas, for example in certain parts of Canada. In certain parts of the world, particularly China, osteomalacia of the mother produces skeletal changes in the foetus. Death of the foetus or newborn infant results in 30 per cent. of all pregnancies complicated by diabetes mellitus; marked overweight, excessive

erythropoiesis in the liver with nucleated red blood cells in the peripheral blood, and sometimes hyperplasia of islets of Langerhans are found in the foetus. Evidence for the transfer to the foetus of excessive hormones is provided by Friederichsen, who reports infantile tetany not responding to the usual treatment in an infant whose mother was found to be suffering from latent osteitis fibrosa.

See also abstr. 2471 (jaagziekte), 2474 (calf scours), 2661 (pneumonia in lambs), 2497, 2617 (shock), 2537 (urinary calculi), 2545, 2546 (anaemia in swine), 2549 (equine colic), 2502 (sulphonamides in veterinary medicine), 2616 (asthma), 2618 (myoglobinuria paralytica), 2658 (vesicle haematuria in cattle), 2647 (livestock diseases in Australia), 2659 (in Nigeria), 2660 (in Tanganyika), 2661 (in Michigan), 2662 (in Holland).

## NUTRITIONAL AND METABOLIC DISORDERS

BUENO, P. (1944.) A influência dos estados de carencia nos períodos da gestação e do aleitamento, na espécie suína. [Effect of dietary deficiency on the duration of gestation and lactation in pigs.]—*Bol. Soc. paulista Med. vet.* 6. 29-32. 2528

Lack of proteins, vitamins, certain minerals and other essential factors found in green food is responsible for foetal death and expulsion, or for weakness, anaemia and nervous symptoms in the newly born pig.—I. W. J.

GRAU, C. R. (1945.) Deformity of the tongue associated with amino acid deficiencies in the chick.—*Proc. Soc. exp. Biol., N.Y.* 59. 177-178. 2529

Chicks being fed a diet deficient in isoleucine, leucine, or phenylalanine were found to exhibit a tongue deformity characterized by folding back of the tip on to the dorsal surface. Diets deficient in several other amino acids did not produce this condition. With the provision of an adequate diet the lesion rapidly healed and the birds became normal.—C. W. O.

(1945.) [Discussion on] Mineral imbalance. [Speakers: JONES, T. R., HINDMARSH, W. L., & FRANKLIN, M. C.]—*Aust. vet. J.* 21. 47-49. 2530

JONES discussed the various circumstances under which symptoms of hypocalcaemia and hypomagnesaemia are seen in the field, particularly with reference to sheep. FRANKLIN referred particularly to calcium-phosphorus imbalance in rations provided for sheep under drought conditions or when stud sheep are almost entirely hand-fed. Resulting abnormalities are the development of hypocalcaemia, loss of appetite and body weight, grossly abnormal dentition and retarded development in young sheep with heavy mortality if the imbalance is continued. The several factors which may contribute to the occurrence of hypocalcaemia were discussed, such as dosing with carbon tetrachloride, fasting, advanced pregnancy, parasitic infestation and cold inclement weather after shearing. HINDMARSH briefly discussed the aetiology of grass tetany and milk fever and the feed conditions associated therewith.

—D. A. GILL.

HOLLANDER, W. F., & RIDDLE, O. (1946.) Goiter in domestic pigeons.—*Poult. Sci.* 25. 20-27. 2531

The authors describe the occurrence of many cases of goitre amongst pigeons reared on Long Island, New York, and in Sumter, South Carolina. Racial difference in the incidence of goitre was clearly demonstrated, although all races were reared in the same environment. An increase to over a gramme in the weight of the thyroid glands, noticed at P.M. examination, was the first indication that goitre existed amongst these pigeons. The glands could be palpated during life and, by pressure on the trachea, might cause asthmatic wheezing; birds were usually plump and fat, but rather lethargic; the skin round the eyes was puffy and the feathers had an unkempt appearance. The histology of the condition is described. A very small supplement of potassium

iodide was sufficient to prevent goitre and to cure affected pigeons.

Debility of their young at hatching was the most serious condition associated with goitre; egg production and fertility were not notably affected. Symptoms of this debility were delayed hatching, haemorrhage from the embryonic membranes during hatching, frequent death during hatching, umbilical hernia and anaemia. In some of the squabs dying at hatching, the thyroids were hyperaemic and enlarged. A potassium iodide supplement in the diet of the adult prevented goitre and most of the cases of weakness in the offspring at hatching.

Thyroidectomy carried out on five pigeons did not result in weakness in any of the young.

The authors concluded that this study demonstrated the desirability of an iodine supplement in the diet of these pigeons.—J. D. BLAXLAND.

NICHOLSON, L. W., & BRENNAN, W. R. (1945.) Goiterogenic diets and their effects on thyroid hyperplasia and vital organs of the chick.—*Poult. Sci.* 24. 426-433. 2532

War-time rations of low iodine content fed to chicks produced thyroid hyperplasia. Some of the iodine-deficient rations contained meat scraps and bone meal; others consisted only of vegetable material which included a high level of soya bean meal. The former, but not the latter, type of ration tended to stimulate sexual development, as indicated by comb and gonad weights. The addition of distillers' dried solubles did not counteract the effect of the goiterogenic diets. Birds showing the most marked thyroid enlargement had, in general, the greatest mean body, comb and gonad weights. Rations containing cottonseed meal, dried solubles, alfalfa meal or maize gluten meal resulted in intestines of greater length but of smaller diameter and with thinner walls than those of control birds. It is concluded that goiterogenic diets are not necessarily detrimental to growth and general development of chicks up to 11 weeks old.—E. M. CRUICKSHANK.

TYLER, C. (1945.) The porosity of egg shells, and the influence of different levels of dietary calcium upon porosity.—*J. agric. Sci.* 35. 168-176. 2533

T. used three groups of four Rhode Island Red pullets to study the porosity of egg shells and the influence upon it of different levels of dietary calcium. The three groups of birds were fed an ordinary basal ration with the addition of 8, 4, and 0% ground limestone respectively; after 21 days (period 1) on this diet, all 12 birds were given the ration containing 4% limestone (normal calcium) for 14 days (period 2), when the experiment ended.

A method of assessing porosity by weight losses under standard conditions was used; the values obtained by this method are referred to as porosity coefficients.

The low calcium diet soon led to cessation of egg production, but on an average the eggs from this group had much higher porosity coefficients than those from the hens on normal calcium diet; no soft-shelled eggs were laid by these birds. The high calcium diet had no apparent ill-effects on two birds, but the other two laid many abnormal eggs, including soft-shelled, thin-shelled and double-yolked eggs; production was as good as in birds on a normal calcium diet. Porosity coefficients in this group were on the average slightly lower than in the normal calcium group. With the birds fed the normal calcium diet throughout, the porosity coefficients were significantly higher in period 2 than in period 1; egg production also fell in the second period.—J. D. BLAXLAND.

TYLER, C. (1946). The influence of different levels of dietary calcium upon egg-shell thickness, with a study of the relationship between egg-shell thickness and porosity.—*J. agric. Sci.* 36, 111-116. 2534

Groups of laying hens were fed on diets with a high, normal and low Ca content and were then given a normal Ca diet and the shells of all eggs laid during the experiment were examined for thickness and for uniformity. In birds on diets low in Ca there was a gradual thinning of the egg shells, although no soft eggs were laid. No general increase in shell thickness occurred in eggs from birds on a diet high in Ca and some soft-shelled eggs were laid in this group. Some decrease in uniformity of shell thickness was observed with diets high and low in Ca. Neither shell thickness nor uniformity of shell thickness was related to the particular position of an egg in a clutch laid by birds on any of the diets, and no relationship existed between shell thickness and porosity of eggs produced from birds on normal Ca diets; with high and low Ca intakes, however, eggs were produced in which there was a significant and negative correlation between porosity and thickness of the egg shell.—A. EDEN.

SHEEHY, E. J., SENIOR, B. J., & BURKE, E. M. (1945.) Does meat and bone meal cause nutritional disorders in chickens?—*J. Dep. Agric. Eire.* 42, 194-213. 2535

Observations were made of the growth rate, the incidence of leg-weakness associated with "curled-toe", and the mortality rate of chickens fed on a series of diets which included meat meal, and meat and bone meal. The meat and bone meal used contained 40-50% protein, 26%  $\text{Ca}_3(\text{PO}_4)_2$  and 3% fat; the meat meal, specially prepared, contained 70% protein and 4%  $\text{Ca}_3(\text{PO}_4)_2$ . Variable results from the diets were attributed to their varying content of members of the vitamin B complex, as a result of variation of the amounts of liver included in the preparations. Meat and bone meal is generally a poor source of riboflavin, and diets made up of this product with oats, barley and maize, all low in riboflavin, led to poor growth rate, high mortality and a high incidence of the condition of leg-weakness associated with "curled toe" in groups of chickens. When these cereals were wholly or partly replaced by the slightly richer sources of riboflavin in the form of wheat offals, the chicks made better progress; nevertheless, growth rate was sub-optimal, and the leg-weakness condition was still evident. With still richer sources of riboflavin, such as fresh liver, liver meal, dried yeast, milk, young grass, grass meal and lucerne leaf meal, growth rate was much improved and leg-weakness greatly reduced in incidence.

When chickens were fed more than 15% meat and bone meal, leg-weakness developed associated with swollen hocks and slipped tendons (perosis); the incidence was more severe as the percentage in the diet was increased. Substitution of the meat meal led to the disappearance of the perosis, and the suggestion is made

that the excessively high amounts of calcium phosphate in the diet, possibly accompanied by a relative Mn deficiency, had caused the perosis. The substitution of meat meal for meat and bone meal did not eliminate leg-weakness but the further inclusion of riboflavin in the diet reduced the incidence to negligible proportion without, however, restoring optimal growth rate.

Meat meal partially decomposed after manufacture did not necessarily prove toxic when fed to chickens, although in practice the use of decomposed foods is strongly deprecated. The source of the meat and bone meal, whether derived from horses or cattle, did not materially affect the findings on chicken growth.

With diets of the above type leading to leg weakness and perosis, the kidneys were usually pale, mottled and swollen, with the cells showing serious degeneration and the ureters swollen as a result of an accumulation of urates. Before death, coma with a rise in blood uric acid was a fairly constant finding. This nephritic condition is, however, regarded as secondary since it can be induced by marked deficiencies or excesses of certain dietary factors and occurs in pathological conditions such as coccidiosis.

It is concluded that neither meat meal nor meat and bone meal fed at normal levels of not exceeding 13% of the total diet is responsible for the production of disorders in chickens *per se*, but that such diets need supplementing with certain essential nutritive factors especially riboflavin and other members of the vitamin B complex. The use of excessive amounts of meat and bone meal should definitely be avoided.—A. EDEN.

DANIEL, L. J., FARMER, F. A., & NORRIS, L. C. (1946.) Folic acid and perosis. [Correspondence].—*J. biol. Chem.* 163, 349-350. 2536

Using a diet which was adequate in choline, biotin and manganese but containing only 50 mg. instead of the usual 100 mg. inositol per 100 g., the authors found that the incidence of perosis in chicks varied inversely with the amount of folic acid in the diet.

Addition of succinylsulphathiazole at a 2% level accentuated the perosis but caused no unfavourable effect on growth or haemoglobin formation. About 30  $\mu\text{g}$ . folic acid per 100 g. diet was necessary to prevent perosis when sulphonamide was present, whereas about 20  $\mu\text{g}$ . was sufficient in a non-sulphonamide diet. It is suggested that folic acid acts indirectly by stimulating the intestinal micro-organisms to produce the anti-perotic factor.—R. ALLCROFT.

BASSETT, C. F., HARRIS, L. E., SMITH, S. E., & YEOMAN, E. D. (1946.) Urinary calculi associated with vitamin A deficiency in the fox.—*Cornell Vet.* 36, 5-16. [Authors' summary slightly amended.] 2537

Seventy fox pups and their dams were placed on a vitamin A-low diet when the former were 21 days old. The pups were weaned at 49 days of age, and divided into six groups which received the same basal ration plus 0, 15, 20, 25, 50 and 100 I.U. of vitamin A per kg. of body weight per day, respectively.

The first specific deficiency symptom noted was head cocking, followed by unsteadiness of gait or weaving, periods of whirling, xerophthalmia, emaciation, coma, and death.

Autopsy studies revealed urinary calculi, gastritis, enteritis, pyelitis, and general inflammation of the urinary tract. In some cases, pus was found around the feet, on the jaws, and in the urinary tract. At times the milk and adult teeth were present in the same socket, and many times the small, discoloured adult incisors were chipped or broken on the upper corners.

The incidence of calculi in the kidneys and bladder was associated with the amounts of vitamin A fed. No



calculi were observed in the group receiving 100 I.U. of vitamin A per kg. of body weight.

Growth was definitely subnormal for the first four groups, and was accompanied by high mortality. The growth of the last two groups was superior to that of the first four, but still not equal to that of normal animals at the station.

Blood samples taken from all animals living on September 17 [approximately 112 days after the experiment began] contained vitamin A in only eight animals of lot 5, and six foxes from lot 6.

All other animals gave a negative test. At the termination of the experiment [December 9], three animals from lot 4 and all survivors from lots 5 and 6 had some vitamin A in the blood. These results substantiate the conclusion that the animals were severely depleted of their vitamin A reserves at the beginning of the experiment.

The pelts produced were poor in quality, badly off color, and lacking in underfur. This condition could have been due to the severe depletion of vitamin A at the start of the experiment, or to some other factor.

KRIFT, G. (1941.) Over de resorptie van caroteen door kuikens. [The absorption of carotene by chickens.] —*Tijdschr. Diergeneesk.* 68. 701-704. [English, French and German summaries.] [Abst. from English summary.] 2538

Chickens given dried grass, containing 100-300 µg. carotene, absorbed approximately 40%; this was not increased by the simultaneous administration of oil, which in one case inhibited absorption.

From their experiments the authors conclude that the necessary amount of vitamin A for a chicken three months old can be supplied in 1 g. of dried grass per day.

IRVING, J. T. (1946.) A comparison of the action of vitamin D on the teeth of rachitic rats with that of additional calcium or phosphorus added to rachitogenic diets.—*J. Physiol.* 104. 253-265. 2539

The changes in the teeth of animals placed initially on diets with a high or low Ca : P ratio appeared identical when the ratio of the diet was adjusted to a normal one. Vitamin D produced a similar histological change in the teeth of animals on a low Ca : P diet, but a different response in animals on a high Ca : P ratio diet.—E. M. C.

SCHWEIGERT, B. S., MCINTIRE, J. M., HENDERSON, L. M., & ELVEHJEM, C. A. (1945.) Intestinal synthesis of B vitamins by the rat.—*Arch. Biochem.* 6. 403-410. 2540

Growing rats on synthetic diets containing sucrose were not dependent on the caecum to any great extent for synthesis or absorption of the components of the vitamin B complex. When lactose was the only carbohydrate component of the diet, synthesis of riboflavin was decreased by caecotomy or by feeding sulphasuxidine. Lactose was a better medium than sucrose for thiamine and riboflavin synthesis, but a certain amount of riboflavin in the diet appeared to be required to support a flora capable of synthesizing more thiamine and riboflavin.—E. M. CRUICKSHANK.

KENNEDY, C., & PALMER, L. S. (1945.) Biotin deficiency in relation to reproduction and lactation.—*Arch. Biochem.* 7. 9-13. 2541

Biotin deficiency in the rat is characterized by denuded areas around the eyes, nose and on the abdomen, erythematous areas on the face and head, a peculiar hopping gait and, occasionally, a reddish-brown pigmentation of the skin on the back. The need for this constituent begins early in intra-uterine life. It is required for successful gestation and viability of the young and probably also for lactation, though the authors

observe that the fact that folic acid was not added to the rations used may have been partly responsible for the poor lactation observed.—E. M. C.

McKIBBIN, J. M., THAYER, S., & STARE, F. J. (1944.) Choline deficiency studies in dogs.—*J. Lab. clin. Med.* 29. 1109-1122. 2542

Various synthetic diets, adequate in respect of growth factors and vitamins, were developed in attempts to produce a choline-deficient ration for weaned puppies. One difficulty in developing such a diet is that methionine seems to be effective in preventing manifestations of choline deficiencies in the dog. After a satisfactory low choline diet had been produced the addition of 0.7% dl-methionine or 0.1% choline chloride appeared to be sufficient to render the diet adequate in all respects; the choline requirement of growing puppies appears to be not more than 50 mg. per kg. body weight per day. On a specifically low choline diet fatal deficiency may be produced in less than three weeks and is characterized by severe fatty infiltration of the liver.

Biochemical studies of the blood and tissues of choline-deficient animals show that the condition is accompanied by a rise in plasma phosphatase, an impairment of the capacity to eliminate bromsulphalein, and a fall in plasma cholesterol and cholesterol esters, whilst the lipid content of the liver is vastly increased, comparable with that found in severe fatty infiltration, although the cholesterol content of the liver is unaffected. In addition during the manifestations of severe deficiency, there is an increase in prothrombin time and a decrease in blood Hb, haematocrit and plasma proteins. Analyses of both heart and pectoralis major muscles showed that in choline deficiency the total creatine content is not significantly lowered, nor is there any consistent lowering of the blood creatinine.—A. EDEN.

KREHL, W. A., TEPLY, L. J., & ELVEHJEM, C. A. (1945.) Effect of corn grits on nicotinic acid requirements of the dog.—*Proc. Soc. exp. Biol., N.Y.* 58. 334-337. 2543

Dogs fed a synthetic ration in which 60% of the sucrose was replaced by crushed maize grew markedly less than dogs fed a whole milk or synthetic ration of the same nicotinic acid content. The effect of the maize grits on growth and on increasing the nicotinic acid requirement could be counteracted by large doses of nicotinic acid (5.0 mg. per 100 g. of diet). This level of nicotinic acid was about three times as much as was required for comparable or better growth on a synthetic or whole milk ration.—E. KODICK.

LEPKOVSKY, S., BIRD, F. H., KRATZER, F. H., & ASMUNDSON, V. S. (1945.) The comparative requirements of chicks and turkey poults for pantothenic acid.—*Poult. Sci.* 24. 335-339. 2544

Results obtained in a series of experiments indicated that poults need more pantothenic acid than chicks. The chick's requirement varied from 3.6-9.0 mg. and that of the poult from 9.7-11.7 mg. per kg. of food.—E. M. CRUICKSHANK.

CARTWRIGHT, G. E., WINTROBE, M. M., & HUMPHREYS, S. (1944.) Studies on anaemia in swine due to pyridoxine deficiency, together with data on phenylhydrazine anaemia.—*J. biol. Chem.* 153. 171-182. 2545

The authors studied the mechanism by which anaemia due to pyridoxine deficiency is produced. The destruction of haemoglobin in the pig was similar to that found in man. Studies of the serum bilirubin, reticulocyte count, icterus index, urobilinogen excretion in the faeces and urine, and urinary excretion of porphyrin, or comparison with the anaemia induced by

phenylhydrazine, indicated no increased rate of haemolysis in pyridoxine deficiency. The high concentration of ferric iron in the serum and the haemosiderosis of the tissues found in vitamin B<sub>6</sub> deficiency could be prevented by restricting the dietary intake of iron. Therapeutic trials with substances containing iron did not cure the anaemia of pyridoxine-deficient animals and their neurological lesions and fatty livers were also not improved by this treatment. The authors conclude that the ferraemia and haemosiderosis are due to continued absorption or decreased excretion of iron at a time when its utilization for formation of haemoglobin is at a minimum.—E. KODICEK.

CARTWRIGHT, G. E., WINTROBE, M. M., BUSCHKE, W. H., FOLLIS, R. H., Jr., SUKSTA, A., & HUMPHREYS, S. (1945.) Anemia, hypoproteinaemia, and cataracts in swine fed casein hydrolysate or zein: comparison with pyridoxine-deficiency anaemia.—*J. clin. Invest.* 24. 268-277. 2546

Swine fed a synthetic diet, in which the protein was supplied in the form of an acid hydrolysate of casein or by feeding zein, failed to grow and developed normocytic normochromic anaemia. The iron concentration

See also absts. 2520, 2521 (neuritis and hysteria in dogs), 2522 (six-day chick disease), 2573 (cobalt poisoning), 2574 (trace elements), 2547 (animal nutrition in Australia).

## PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

BLAXTER, K. L. (1946.) Experiments with iodinated casein on farms in England and Wales.—*J. agric. Sci.* 36. 117-150. 2548

It is known that the milk yield of cows can be substantially increased by feeding iodinated casein during the middle and later part of lactation. The optimum increase in milk yield is 20% and the loss of weight caused by increased thyroid activity can be balanced by feeding extra concentrates. This article deals with a large-scale experiment on commercial farms in England and Wales, in which a total of 1,164 cows were used, half of them being fed iodinated casein incorporated in cattle cubes for a period of six weeks. The iodinated casein was tested for biological activity using *Xenopus* tadpoles and the daily dose was 20 g. of a mixed sample incorporated in 4 lb. of cattle cubes.

The 102 herds were spread over 97 farms in 37 counties in England and Wales and included a variety of breeds. The period of dosing was preceded by a preliminary period of observation of two weeks and a final period of four weeks. Cows in each herd were paired on a basis of age, stage of lactation, milk yield, breed and bodily condition and one of each pair was used as a control.

The following are the main conclusions:—

(1) 4% of the animals refused the iodinated casein, refusals being more common among Channel Island cattle.

(2) The mean increase in daily milk yield was 5.44 lb. (22.2%) and the total increase was approximately 26 gal. per animal over the six-week period. Heifers gave a poorer response than mature cows, probably because of their higher metabolic rate.

(3) The increase in milk yield was greater the longer the cow had been in milk when dosing began: cows which maintained good yields of milk when over half-way through their lactations responded particularly well. It seemed that the response to dosing with iodinated casein depended on the metabolism of the udder cells and the amount of udder parenchyma available for stimulation.

(4) When iodinated casein was withdrawn, the milk yield remained high for a few days and then fell

in the serum was normal; the bone marrow was normo- or hypo-plastic. Marked hypoproteinaemia and oedema were found. Opacities in the lens occurred in two out of three animals receiving acid-hydrolysed casein or zein. These changes may be caused by a deficiency of tryptophane. The anaemias observed in tryptophane and pyridoxine deficiency showed marked differences, though a faulty tryptophane metabolism was involved in pyridoxine deficiency. A low intake of tryptophane retarded the course and diminished the severity of the nutritional disorder caused by pyridoxine deficiency in swine.—E. KODICEK.

METCALF, D., HUCKER, G. J., & CARPENTER, D. C. (1946.) A growth factor in certain vegetable juices.—*J. Bact.* 51. 381-384. [Authors' summary copied verbatim.] 2547

There is present in tomato and certain other vegetable juices an unidentified growth accessory substance. This "T" factor may act in conjunction with thiamine, but its heatstable properties indicate that it is distinct from thiamine. The "T" factor was also found in liver, string beans, carrots, beets, onions, cabbage, peppers, spinach, and orange juice.

severely. The fall was made less abrupt by feeding additional food and by gradual reduction in the dosage of iodinated casein.

(5) Approximately 20% of the cows lost weight, as judged by eye; weighing showed that the smaller animals lost most weight.

(6) The heart rates of some of the animals were taken and showed an average increase of 10.2 beats per minute, the increase being less in heifers. The normal heart rate of control heifers was higher than in control mature cows.

(7) Overdosing with iodinated casein caused severe symptoms of hyperthyroidism.

(8) It is recommended that iodinated casein be used on selected farms where increases in milk production can not be obtained by attention to management, disease control, or better feeding. The dangers of overdosing are stressed: animals of the small breeds should receive only 15 g. daily. It is calculated that at current prices the use of iodinated casein would be highly economic and that the total winter milk production in many herds could be increased by over 10% during February and March.

The data are treated statistically and are presented in the form of 59 tables.—E. G. WHITE.

SCHÜTZLER, G., & PERNITZSCH, G. (1944.) Innendruck und Fassungsvermögen des Grimm- und Mastdarmes des Pferdes. [Internal pressure and capacity of the colon and rectum of the horse].—*Arch. wiss. prakt. Tierheilk.* 79. 81-98. 2549

The colons and rectums of 30 horses were prepared immediately after slaughter for recordings of internal pressures, capacity, weight and length. [In this article the authors have designated the rectum as the portion of intestine extending from the junction of large and small colon to the anus.]

A relation between internal pressure, weight and capacity of these portions of the intestine has been established, in that increase of these properties in the one part is associated with a corresponding increase in the other. The average findings in the animals under review were as follows: the colon was ruptured at a



pressure of 73.5 g. per sq. cm. with a capacity of 80 litres; the rectum at a pressure of 120 g. per sq. cm. with a capacity of 20.7 litres; the weight of the colon was 8.2 kg., of the rectum 3.9 kg.; the length of the colon was 3.78 m., of the rectum 3.43 m. The most common site of rupture was the funnel-shaped portion at the termination of the colon; the serous membrane was the first to rupture, followed by the muscular coat and finally by the mucous membrane.—C. W. OTTAWAY.

Roos, J., & ROMIJN, C. (1941.) De gaskamer van het bebroede kippenei en haar betekenis voor het kuiken. [The airspace in the hatching egg and its importance for the chick.].—*Tijdschr. Diergeneesk.* 68. 3-13. [English, French and German summaries.] [English summary slightly amended.] 2550

The authors studied the volume, pressure and composition of the gases contained in the airspace of the hen's egg, using an apparatus fixed to the blunt end of the egg but which did not impair the development of the chick. The foetal stage of the chick terminates up to 24 hours before it hatches; in 85% of cases pulmonary breathing has already completely, or in part, replaced allantoic respiration, the air sac supplying the necessary gases. In the air space the oxygen percentage is 9 or less and there may be more than 9% carbon dioxide. The physiological importance of this "parafoetal" period is discussed.

Gyözö, N. (1943.) [Haemoglobin content of blood samples from piglets.].—*Inaug. Diss., Budapest.* [Abst. from abst. in *Berl. Münch. tierärzt. Wschr./Wien. tierärzt. Mschr.* May 12th. 159. (1944).] 2551  
By using a colorimetric technique G. found the haemoglobin content of the blood of pigs 1-7 days old to be 9.2%, with a variation of  $\pm 1.36\%$ . The haemoglobin content of blood is higher in older pigs and in boars. In older animals increase in body weight was found to be accompanied by a decrease in the haemoglobin content of the blood.—T. E. GIBSON.

BLOM, E. (1943.) Om Bedømmelsen af Tyrespermernes Morfologi. [The morphology of bull sperm.].—*Maanedsskr. Dyrlæger.* 55. 185-216. 2552

B. gives a general survey of work done, with special reference to atypical and immature sperms and describes his own technique for examining specimens from more than 200 bulls.

The sample is diluted 4:5 with 1% NaCl in distilled water (optimum results are obtained with approximately 200,000 sperms per c.mm. and the average specimen contains one million per c.mm.), mixed well and transferred to a slide, spread and dried in air. The specimen is fixed by passing over a flame, cooled and the residual NaCl solution is washed off. A freshly prepared mixture of one part 1% anhydrous  $\text{Na}_2\text{CO}_3$  solution with nine parts 1% methyl violet solution (6B) is added while the preparation is still damp. The colour is absorbed in  $4\frac{1}{2}$  min. Excess colour is poured off and the specimen is rinsed 3-4 times with distilled water, but not for more than 10-15 sec. Excess water is removed with filter paper and the slide is dried in air. The specimen can be mounted in Canada balsam if desired. Photomicrographs show sperms with sharp contours, both head and tail coloured clear violet. Bacteria are also clearly stained.

To judge the proportion of immature sperms, characterized by little buds of cytoplasm easily torn away in fixing and staining, B. found it advisable to examine fresh specimens under the microscope with the condenser, when preparations were required for later reference, he mixed the specimen with 4-5 parts of gelatinous opal blue solution or "Tusch", spreading it evenly on the slide. Under the microscope these

preparations look like negatives, with clear, uncoloured sperms against a blue-greyish background.

B. advises the regular examination for abnormal and immature sperms of samples from all bulls used for artificial insemination. He also mentions a project for extensive research on sperm morphology in Denmark.

—M. EKENBERG.

TRIMBERGER, G. W., & DAVIS, H. P. (1945.) Predictability of breeding efficiency in dairy cattle from their previous conception rate and from their heredity.—*J. Dairy Sci.* 28. 659-669. 2553

This report is based on the analysis of breeding records for Ayrshire, Guernsey, Jersey and Friesian cows artificially inseminated over an eight-year period in the University of Nebraska herd. The health of the herd was good and it was free from contagious abortion.

It was found that during summer and late autumn more services per conception were required than in other months, the highest number being in August, with an average of 2.24 services per conception. It was not possible to predict from the breeding efficiency of one year the number of services required subsequently, nor did the rate of conception in the virgin heifers bear any relationship to the services required per conception in later years. Some families had a low breeding rate, while in others it was much higher. The results of these experiments are tabulated in six tables.—D. S. R.

PARKES, A. S. (1945.) The adrenal-gonad relationship.—*Physiol. Rev.* 25. 203-254. 2554

It has long been known that disturbances of the adrenal glands may result in alterations in sexual functions and characters; this article is an excellent and comprehensive review of the experimental evidence concerning the functional relation between the adrenal cortex and the gonads. The differences in size and histology in the adrenals of both sexes in various species at various stages of the sexual cycle are discussed, as are the changes produced by gonadectomy and by the administration of gonadal hormones. The effects on the gonads of adrenalectomy and of the administration of adrenal extract are then described. It is known that the gonads may, under certain circumstances, show some adrenal-like activity. In dogs, for example, the survival time after adrenalectomy is influenced by the sexual condition of the animal at the time of operation.

The next section describes the effects of the sexual condition on the survival time after adrenalectomy and on the water retention during the reproductive cycle, together with the effects on the adrenal cortex produced by gonadal hormones.

Lastly P. discusses the gonad-like activities exerted by the adrenal cortex, including (1) the evidence that the adrenals secrete androgens and oestrogens, (2) a short description of the findings in the adreno-genital syndrome and discussion of their significance in relation to the changes in the adrenal cortex, (3) the effects of cortical extracts and hormones on the accessory reproductive organs and secondary sexual characters, (4) the evidence for the presence of gonadal hormones and similar substances in the adrenals and (5) the excretion in the urine of androgens and oestrogens after gonadectomy and in various abnormalities of the adrenal gland.

—J. M. ROBSON.

FEKETE, E. (1946.) A comparative study of the ovaries of virgin mice of the dba and C57 black strains.—*Cancer Res.* 6. 263-269. [Author's summary slightly amended.] 2555

A comparative study of the right ovaries of virgin dba and C57 black mice revealed the following differences:

(a) The average number of ova escaping from one

ovary at a given ovulation is 5.2 in dba and 4.2 in C57 black mice. As the growing follicles are the source of oestrogen, it can be presumed that this hormone is produced in larger quantity in the dba mice.

(b) In C57 black virgin mice 3 sets of corpora lutea are the most that can be found in an ovary. In the ovaries of dba mice the corpora lutea persist for a longer period, and 7 or more sets may be present. Consequently it can be presumed that a larger quantity of progesterone is produced in the ovaries of the dba mice.

(c) In older animals hyaline changes occur in the lutein cells of persistent corpora lutea in dba mice, and in some ovaries large hyalinized areas are present; this alteration does not occur in the ovaries of C57 black mice.

(d) Groups of yellow lipochrome cells originating in corpora lutea atretica undergo atrophy and become dispersed in the ovarian stroma of dba mice, while in C57 blacks these cells become hypertrophic and form aggregated nodules.

(e) Ovarian cysts occur more frequently in dba mice (30.7 per cent) than in C57 black mice (13.4 per cent).

COWIE, A. T., & FOLLEY, S. J. (1946.) Some factors affecting the absorption rate of subcutaneously implanted hormone tablets.—*J. Endocrinol.* 4. 375-385. 2556

The absorption rate of compressed hexoestrol tablets is practically independent of the pressure used in their manufacture. The initial absorption rate of cast and compressed tablets of testosterone is about equal. The absorption rate of cast cylinders of testosterone is, at any time, proportional to the surface area. The absorption rate of tablets of hexoestrol and testosterone is not increased by dilution with lactose (25-50%), but is decreased thereby during the later stages of absorption.—J. M. ROBSON.

PARKES, A. S. (1946.) Some factors affecting absorption from implanted tablets.—*J. Endocrinol.* 4. 386-391. 2557

Absorption of hexoestrol and stilboestrol from tablets diluted with lactose (39 or 49%), with 1% stearic acid as lubricant, was no more and probably less rapid than from tablets not so diluted. Absorption was retarded by the crowding together of several tablets into one subcutaneous pocket. Absorption is at least as rapid, and may be much more so, when tablets are implanted intraperitoneally as when they are implanted subcutaneously.—J. M. ROBSON.

DEANESLY, R., FOLLEY, S. J., & PARKES, A. S. (1946.) Further observations on the formation of "ghosts" in subcutaneously implanted tablets.—*J. Endocrinol.* 4. 422-425. 2558

The formation of "ghosts", i.e., protein deposits in subcutaneously implanted tablets, has been examined in tablets of 67 different substances. The phenomenon is not restricted to the hormonal steroids and biologically related substances. It occurs in compressed tablets of a wide range of synthetic substances, including benzyl sulphaniamide, and in all the inert steroids examined.—J. M. ROBSON.

ANCEL, P., & LALLEMAND, S. (1943.) Sur l'arrêt de développement de l'œmion obtenu à l'aide de certaines hormones. [Arrested development of the amnion in the chick embryo caused by certain hormones.—*C. R. Soc. Biol. Paris.* 137. 324-325. 2559

Six substances have been found which inhibit the development of the amnion in the chick embryo, viz, testosterone propionate, progesterone, desoxycortone, ricin, abrin and trypaflavine. Many other substances

tested, including oestradiol benzoate and thyroxin, did not produce this effect.—J. M. ROBSON.

FLEISCHMANN, W., & FRIED, I. A. (1945.) Studies on the mechanism of the hypercholesterolemia and hypercalcemia induced by estrogen in immature chicks.—*Endocrinology.* 36. 406-415. 2560

Injection of oestradiol dipropionate gives large increases in serum calcium, cholesterol, and inorganic, lipid and protein phosphorus. This does not occur when thyroxin is given at the same time. Thioracil produces only a rise in serum cholesterol. The changes in serum cholesterol produced by these drugs are not due to changes in synthesis or destruction of cholesterol, but to alterations in the distribution of cholesterol between plasma and tissues. The oestrogen-induced increase in serum calcium is probably due to the formation of the organic phosphorus compounds necessary to bind the calcium.—J. M. ROBSON.

CHAMORRO, A. (1941.) Sur le rôle de la thyroïde dans la réponse des ovaires à l'administration d'extraits gonadotropes. [The role of the thyroid in the response of the ovary to administration of gonadotropins.—*C. R. Soc. Biol. Paris.* 135. 55-58. 2561

A gonadotropic extract from the urine of ovariectomized women has more action on the ovaries of normal immature rats than on those of recently hypophysectomized animals and still less effect in animals hypophysectomized several days before treatment. The thyroid plays no appreciable part in the ovarian response to the gonadotropic preparation: of chief importance are the presence of the animal's own pituitary and the condition of the ovaries at the beginning of the experiment.—J. M. ROBSON.

UNGAR, G. (1945.) Endocrine function of the spleen and its participation in the pituitary-adrenal response to stress.—*Endocrinology.* 37. 329-340. 2562

The application of various stimuli (trauma, haemorrhage, some drugs, etc.) to g. pigs produced a response which includes a reduction of the bleeding time and is believed to involve the pituitary and adrenal glands. This response is inhibited by splenectomy and spleen extracts contain an active substance which can reproduce the reaction to the original stimulus. The active substance has been isolated and obtained in pure crystalline form. It is probably part of the anti-enzyme system which protects proteins against trypsin. The spleen, as an endocrine organ, may therefore play a part in the control of protein metabolism and its adjustment to conditions of stress.—J. M. ROBSON.

LEFÈVRE, G. (1945.) Importance du facteur fonctionnel et du facteur hormonal dans la structure du canal déférent du coq domestique. [Action of hormones on the vas deferens of the cock.—*C. R. Soc. Biol. Paris.* 139. 399-401. 2563

After total castration, marked atrophic changes occur in the vasa deferentia. After unilateral castration, atrophic changes on the same side chiefly involve the muscular layer; presumably this is due to an absence of functional contractile activity. Injection of testosterone propionate in castrated animals has an effect on the epithelium but not on the muscle.—J. M. ROBSON.

DANFORTH, C. H. (1944.) Relation of the follicular hormone to feather form and pattern in the fowl.—*Yale J. Biol. Med.* 17. 13-18. 2564

This is an account of new properties which can be ascribed to the follicular stimulating hormone, in particular to its effect upon the pigmentophores which are present in the feather barbs.—C. W. OTTAWAY.

GLAZENER, E. W., & JULL, M. A. (1946.) Effects of thioracil, desiccated thyroid, and stilbestrol deriva-



tives on various glands, body weight, and dressing appearance in the chicken.—*Poult. Sci.* 25. 236-241. 2565

A mash containing 0.1-0.2% thiouracil depressed growth and caused enlargement of the thyroid in growing chickens. Feeding 0.1% desiccated thyroid caused slight depression of growth in male birds, whereas females were not significantly affected. In birds given thiouracil the combs were small and pale as compared with birds given dried thyroid.

Chickens fed diethylstilboestrol for a three-week period at a level of 30 mg. per day gave better dressed carcasses with more abdominal fat, as compared with controls or with birds given thiouracil, dried thyroid, or theelol (0.24 mg. by capsule every other day for three weeks). Dimethyl ether of stilboestrol, fed for two weeks in a dose of 50 mg. per lb. of food, did not improve the finish or increase the weight of the dressed bird. The present cost of diethylstilboestrol would make it unprofitable for the degree of improvement of the dressed bird which it produces. Tasting tests suggested that the birds receiving stilboestrol were more highly flavoured than the controls.—*E. G. WHITE.*

FIELD, E. J. (1946). The early development of the sheep heart.—*J. Anat.* 80. 75-87. [Author's summary copied verbatim.] 2566

An account is given of the mechanism of extra-embryonic vasculogenesis in the sheep. The process of cardiogenesis is traced from its first stages up to the formation of an unpaired heart rudiment, and is found to show differences from that described for many mammals (such as the rabbit, cat and dog) but striking similarity to that which takes place in the guinea-pig and more especially in man. The origin of vasoformative cells is discussed with reference to their 'germ-layer' origin. The existence of a ventral mesocardium is established, and its significance indicated.

VEENENDAAL, H., & WINSSER, J. (1941). Het derde ooglid der kleine huisdieren, meer in het bijzonder van de kat. [The membrana nictitans in small domestic animals, especially cats.]—*Tijdschr. Diergeneesk.* 68. 705-710 & 711. [English, French and German summaries.] [Abst. from English summary.] 2567

The authors here consider the function of the nictitating membrane in the cat and agree with ROSENBUETH & BARD (1932) that its action is not entirely involuntary. Protrusion of the membrane is not uncommon and generally results from decreased tone of its non-striated muscles; a temporary remedy for this condition is 3% aqueous solution of sanedrin, the *l*-isomer of ephedrine, administered *per os* or instilled into the eye.

ZIEGLER, H. (1945). Zur Anatomie der Liquorpunktionsstellen bei Haustieren. [The anatomy of various puncture sites in domestic animals.]—*Schweiz. Arch. Tierheilk.* 87. 247-253. 2568

On consideration of the detailed anatomy of the regions, Z. has reviewed the injection sites for occipital and lumbar puncture in the ox, horse, pig and dog. The controlling factors for occipital puncture are the proximity of the cerebellum to the foramen magnum and the prolongation of the occipital bone (squama occipitalis) to form the posterior (superficial) border of the foramen magnum. In the ox and pig a direction at right angles to the line of the neck is recommended, in the horse a forward direction through the foramen magnum and in the dog backwards into the atlantal ring. With lumbar puncture, although evidence is produced of a more caudal prolongation of the spinal cord in young animals, the lumbo-sacral space is

recommended for all species under review. This is based on ease of location and size of the opening; alternatives are suggested for the pig and dog. The article is illustrated by a line drawing indicating injection sites; and average distances for penetration of the needle are given.—*C. W. OTTAWAY.*

WEDDELL, G. (1945). The anatomy of cutaneous sensibility.—*Brit. med. Bull.* 3. 167-172. 2569

As a result of recent investigations it has been possible to establish an anatomical basis for physiological interpretations of skin sensibility. The pattern of skin innervation as demonstrated in the rabbit, monkey and man is such that, in general, each unit area is evenly innervated by fibres approaching from all directions. Nerve endings, formed from nerve plexuses which permit of several fibres supplying the area, are disposed over approximately circular areas. Endings are situated at different depths beneath the epidermis; beaded nets and fibres subserve pain, Meissner's corpuscles and Herkel's discs touch, Krause's end-bulbs cold, Ruffini endings warmth and Pacinian corpuscles pressure.—*C. W. OTTAWAY.*

EWERT, H. (1944). Über den Spaltlinienverlauf in der Haut der Haustiere. [The course of cleavage lines in the skin of domestic animals.]—*Arch. wiss. prakt. Tierheilk.* 79. 99-120. 2570

It has been established that cleavage lines in the corium of animals follow a definite pattern and are associated with the direction of underlying connective tissue supporting fibres. Their direction has been studied in 100 bovine foetuses and 39 adult animals (a cow, 22 dogs, four horses and 12 pigs). In early embryos they were arranged circumferentially, but with elongation of the body and growth of the extremities longitudinal lines developed. This suggests a relation between their form and the requirements for skin support and movement. An examination of the lines in adult animals, particularly horse and pig, supports this view. Drawings showing the distribution of cleavage lines are given. Their importance in surgery is discussed.—*C. W. OTTAWAY.*

BRESSOU, C., & VLADUTIU, O. (1944). Les artères, les veines et les canaux biliaires intra-hépatiques chez le chat. [The arteries, veins and bile ducts of the liver of the cat.]—*Rec. Méd. vét.* 120. 161-167. 2571

Investigations of the vascular and biliary systems of the liver of the cat were carried out by dissection of fresh and formalized specimens, by examination of corrosion preparations and by radiological study. Techniques are described.

In general, the arrangement was found to be similar to that in other mammalian livers. The portal vein divides into two main divisions. The left is the larger, its branches passing to the left and both intermediate lobes. The branches of the right division enter the right and caudate lobes. The divisions of the hepatic artery are similarly distributed, but the right intermediate lobe is supplied by a branch from the right division which also furnishes vessels to the gall bladder. Interlobular vessels are distributed in all directions throughout the liver; it was found that often a single vein is accompanied by two small arteries.

Whereas the main branches of both the hepatic artery and the portal vein are situated in the posterior portion of the liver, the hepatic veins, following their origin from intralobular vessels, are more anterior in position and converge towards the diaphragmatic surface where four main veins enter the posterior vena cava.

The biliary ducts, passing in reverse direction, are

arranged in similar fashion to the branches of the portal vein and the terminal divisions unite with the cystic duct to form the bile duct on the posterior surface at the portal fissure.—C. W. OTTAWAY.

KORPÁSSY, B. (1943.) Vergleichende Untersuchungen über die Vorsteherdrüse von menschlichen Neugeborenen, Hunde- und Katzenjungen. [Comparative researches on the prostate gland in the newly born young of human beings, dogs and cats.]-*Berl.*

See also absts. 2490, 2507, 2519 (hormones), 2514 (prolan in lactation), 2531, 2532 (thyroid in fowls), 2541 (biotin in reproduction and lactation), 2621 (thyroid therapy), 2653 (haematology).

## POISONS AND POISONING

CORNIL, L., POURSIÈRES, Y., & DUMONT-LEGRÉ. (1943.) L'hépatite du cobaye intoxiqué par l'acétate de cobalt. Influence de la splénectomie sur le développement des lésions. [Chronic cobalt poisoning in the guinea pig.]-*C. R. Soc. Biol. Paris.* 137. 459-460. 2573

Splenectomized g. pigs survived 21-170 days when given repeated subcutaneous injections of cobalt acetate (2 ml. of a 0.5% solution twice weekly). The mean survival time of non-splenectomized animals was less, but the histological changes (parenchymatous degeneration and reactive changes in the interstitial connective tissue) in the liver were much less severe than in the splenectomized animals. These findings tend to confirm the view that the spleen protects the liver against the toxic action of substances administered parenterally, but at the same time it appears that the presence of the spleen causes a lower general resistance to the action of poisons.—E. G. WHITE.

SMITH, S. E., & LARSON, E. J. (1946.) Zinc toxicity in rats. Antagonistic effects of copper and liver.—*J. Biol. Chem.* 163. 29-38. 2574

When zinc as  $ZnCO_3$  was fed to rats at high levels (0.7-1% of the diet), a microcytic hypochromic anaemia developed within 3-5 weeks, accompanied by a subnormal rate of growth which was not secondary to the anaemia. Addition of copper at the rate of 0.2 mg. daily maintained the haemoglobin values at significantly higher levels and a mixture of iron, copper and cobalt maintained Hb at normal levels, although Fe and Co supplements (2 mg. and 0.2 mg. respectively daily) alone had no effect. Addition of liver extract to the high Zn diet maintained growth near the normal level, but had no effect on the decrease in Hb values; Fe, Cu and Co had no effect on the subnormal growth. A pilot experiment indicated that the liver extract activity was not due to pantothenic acid. It is suggested that these results indicate the possible occurrence of relative deficiencies in addition to absolute deficiencies, i.e., that animals may be deficient in one mineral relative to an excess of another.—R. ALLCROFT.

ALLEN, A. S. (1943.) Pa Ping, or Kiating paralysis.—*Chin. med. J.* 61. 296-301. [In English.] 2575

The author briefly outlines the history and symptomatology of this condition as observed since 1930 in some 200 human beings. The disease is believed to be due to barium contamination of common salt (NaCl).

Onset usually follows a meal. Paralysis of the extremities occurs, often with alarming suddenness, in varying degree from numbness and tingling of the fingers to complete paralysis of the upper and lower extremities. Nausea may be so slight as to pass unnoticed or there may be violent vomiting. Less frequent is diarrhoea. Recovery may be rapid, but in the more severe cases paralysis may involve the whole muscular

*Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* Sept. 17th. 320-321. 2572

In a new-born child an epithelial cell metaplasia is seen in the prostate. The proliferating cells which fill the gland lumen in many places are flat and polygonal, have a small nucleus and contain glycogen. Shortly after birth this epithelium disappears. No such changes are seen in the dog and cat, presumably because in these animals high oestrogen concentrations are not attained at the end of pregnancy.—J. M. ROBSON.

system. Respiration becomes laboured, cyanosis develops, with drooling from the mouth, and terminal paralysis of the heart and respiratory muscles occurs in from a few to 48 hours.

Treatment consists of the early administration of sodium or magnesium sulphate in sufficient doses to precipitate the barium.—H. PAVER.

CHOU, C., & CHIN, Y. C. (1943.) The absorption, fate and concentration in serum of barium in acute experimental poisoning.—*Chin. med. J.* 61. 313-322. [In English.] 2576

Barium, in the form of isotonic barium chloride solution [0.112 molar solution or 1.93%  $BaCl_2$  equivalent to 1.54% Ba ions] was administered at various levels to normal fasting animals (mostly dogs) by stomach tube, intraperitoneally, intravenously, intramuscularly and intracisternally. Dosage levels used in terms of millimols (mM) of the salt per kg. of body weight were: 0.1-1.0 mM in 150 ml. of water, 0.07-1.0 mM, 0.03-0.1 mM, 0.1-0.15 mM and 0.0001-0.0018 mM respectively.

Symptoms could be classified into cardio-respiratory, gastro-intestinal and neuromuscular, the frequency of their occurrence depending on the mode of introduction of the poison. When given by stomach tube, salivation, vomiting and defaecation were particularly conspicuous and diarrhoea and tenesmus frequent. Cardiac and respiratory symptoms were rare.

Neuro-muscular symptoms appeared in most cases as twitching, tremors and motor weakness, followed by paralysis of the skeletal muscles in severe cases. Convulsion, which appeared in a few animals, was usually fatal.

The absorption of the barium was shown to take place in the intestine, but not in the stomach, and the rate of absorption was influenced by the presence of food. Distinctive features due to intravenous injection were marked toxic cardiac effects, with elevated blood pressure. Gastro-intestinal symptoms were less striking, although these occurred invariably. Motor weakness was more apparent than paralysis. Symptoms due to intraperitoneal or intramuscular injection were of the mixed type, while after intracisternal injection, the picture was wholly one of motor excitement.

Curves are given showing the change in barium concentration of the serum with time after administration. The serum concentration of barium was relatively low after ingestion by mouth; higher concentration was attained by parenteral injection. Barium was found to be removed from the blood stream rapidly, half of it in 15-30 min. and three-quarters in two hours.

Brief details of a method for the micro-determination of barium in serum are given.—H. PAVER.

NORRIS, E. R., & ELLIOTT, H. W. (1945.) Tolerance to arsenic trioxide in the albino rat.—*Amer. J. Physiol.* 143. 635-638. 2577



Normal rats exhibit hypothermia after intraperitoneal injections of  $As_2O_3$  in the form of sodium arsenite. The progress of adaptation to increased dosages of arsenic and the toxicity of a single dose were shown by following the hypothermia induced after injection. In this way it was demonstrated that rats acquire a true systemic tolerance to  $As_2O_3$  in solution. The tolerance acquired to arsenic injections was not due to a decrease in the rate of absorption from the body cavity.—A. EDEN.

McCLOSKEY, W. T., & SMITH, M. I. (1945.) Studies on the pharmacologic action and the pathology of alphanaphthylthiourea (ANTU). I. Pharmacology.—*Publ. Hlth Rep., Wash.* 60. 1101-1108. 2578

LILLIE, R. D. (1945.) Studies on the pharmacologic action and the pathology of alphanaphthylthiourea (ANTU). II. Pathology.—*Ibid.* 1108-1113. 2570

I. The acute and chronic effects of alphanaphthylthiourea (ANTU) were studied in albino rats, rabbits, cats and dogs. The work of others had suggested that the drug might be of value for destroying rats. Acute poisoning was accompanied by pleural effusions in all species: the protein content of the effusion was more than half that of the plasma. When progressively increasing doses were given every 3-4 days to rats, tolerance occurred and when such animals succumbed to large doses there was no pleural effusion. Chronic poisoning in cats gave rise to bilirubinaemia, which seemed to be due to altered capillary permeability with leakage of bile from the bile channels into the venous sinusoids.

II. The pathology of ANTU poisoning was studied in a series of four rabbits (dead after 7-20 days), eight rats (dead at 14-34 days), and 17 cats (dead or killed at 13-38 days). Fatty degeneration of the liver was a constant finding and liver necrosis occurred in the rabbits, but was only slight in the other species. In the cat there also occurred signs of intrahepatic obstructive icterus with bile casts in the kidneys. Other lesions included haemosiderosis of the liver and spleen, thyroid hyperplasia, pulmonary oedema and haemorrhage, hydrothorax, and in rabbits fatty changes in the renal epithelium.—E. G. WHITE.

PHILIPS, F. S., & GILMAN, A. (1946.) Studies on the pharmacology of DDT (2,2 bis-(parachlorophenyl)-1,1,1 trichloroethane). I. The acute toxicity of DDT following intravenous injection in mammals with observations on the treatment of acute DDT poisoning.—*J. Pharmacol.* 86. 213-221. 2580

PHILIPS, F. S., GILMAN, A., & CRESCITELLI, F. N. (1946.) Studies on the pharmacology of DDT (2,2 bis-(parachlorophenyl)-1,1,1 trichloroethane). II. The sensitization of the myocardium to sympathetic stimulation during acute DDT intoxication.—*Ibid.* 222-228. 2581

I. A D.D.T. emulsion was prepared for intravenous injection into rats, rabbits, cats, dogs and monkeys. Lethal doses ranged from 25-75 mg. per kg. according to the species used. In general, the symptoms were similar for all the animals and resulted from C.N.S. excitation: they were preceded by a latent period of 5-10 min., and included tremors commencing with the facial muscles and then becoming general, followed by convulsive episodes. After 2-3 hours the animal died of depression and respiratory failure. Some of the animals, particularly dogs, died atypically of ventricular fibrillation.

C.N.S. depressants were tried as therapeutic agents, the most outstanding being phenobarbital which controlled the characteristic tremor and convulsions in doses that caused a minimal degree of general C.N.S. depression.

II. The authors investigated the mechanism whereby D.D.T. causes sudden death by ventricular fibrillation. They found that the intravenous injection of 75-100 mg. per kg. D.D.T. emulsion in anaesthetized dogs sensitized the myocardium so that intravenous injection of adrenalin resulted in ventricular fibrillation. The authors also demonstrated that in D.D.T.-treated, curarized and anaesthetized dogs and monkeys convulsive seizures, as evidenced by increased electrical activity of the brain, were accompanied by cardiac arrhythmia or ventricular fibrillation. Cardiac response was followed electrocardiographically and electrical brain activity by means of an electro-encephalograph. The authors conclude that like other halogenated hydrocarbons D.D.T. sensitizes the myocardium to adrenalin and causes sympathetic discharge: onset of ventricular fibrillation is a result of this dual action of D.D.T.—N. SABA.

TOBIAS, J. M., KOLLROS, J. J., & SAVIT, J. (1946.) Relation of absorbability to the comparative toxicity of DDT for insects and mammals.—*J. Pharmacol.* 86. 287-293. 2582

The authors investigated the toxicity of D.D.T. for the cockroach (*Periplaneta americana*) and the flies *Musca domestica* and *Calliphora* spp. The L.D.50 for cockroaches and flies was about 12 mg. per kg. for surface application of D.D.T. in acetone and about the same for D.D.T. in acetone injected into the abdomen of the cockroach. For the emulsion of D.D.T. injected intra-abdominally into the cockroach, the L.D.50 was 18 mg. per kg.

Comparing their results with those of PHILLIPS & GILMAN [see preceding abst.] the authors concluded that emulsified D.D.T. was about as toxic when injected intra-abdominally into the cockroach as when administered intravenously to mammals. The high toxicity of D.D.T. applied to the surface of insects, contrasting with the low toxicity of D.D.T. applied to the surface of mammals, is due to its efficient absorption by insects but not by mammals.—N. SABA.

LERENA, E. A. (1945.) Acción tóxica del pasto Bermuda. [The toxic action of Bermuda grass (*Cynodon dactylon*).]—*Gac. vet., B. Aires.* 7. 66-71. 2583

L. describes cases occurring between January and June of Bermuda grass poisoning in cattle. The toxic principle of the grass seems to be a blood and nerve poison, producing in many cattle symptoms of nervous excitement, and in fatal cases splenomegaly and slow coagulation of the blood. The mortality rate is low, but the morbidity rate is variable.—I. W. JENNINGS.

PIERCY, P. L., & RUSOFF, L. L. (1946.) Grotalaria spectabilis poisoning in Louisiana livestock.—*J. Amer. vet. med. Ass.* 108. 69-73. 2584

This legume was found to be toxic to cattle and poultry under field and experimental conditions. Extensive haemorrhages were revealed on P.M. examination. The toxic effect was cumulative, death often being delayed for weeks or even months. The poisonous principle is the alkaloid monocrotaline; it is in greatest concentration in the seeds, but is also found in other parts of the plant. The plant is unpalatable, being eaten only when other food is lacking.—R. MARSHALL.

SHEARER, G. D. (1945.) Some observations on the poisonous properties of bracken (*Pteris aquilina*).—*J. comp. Path.* 55. 301-307. 2585

A heifer which consumed in 74 days 915 lb. of bracken without other food became ill after 68 days, with haemorrhage from nose and anus, and had to be destroyed. Another heifer, which in 78 days consumed 678 lb. of bracken mixed in equal parts with other food, gave no signs of poisoning. Examination P.M. indicated

acute poisoning in the first animal but the second was normal. The presence in bracken of a catechol tannin may account for its poisonous properties.—R. M.

MATHEWS, F. P. (1945.) The toxicity of a spurge (*Phyllanthus abnormis*) for cattle, sheep, and goats. —*Cornell Vet.* 35. 336-346. 2586

A spurge (*Phyllanthus abnormis*) which appeared to be associated with serious cattle losses in Culberson County, Texas, was shown by feeding experiments with cattle, goats and sheep to contain a toxic principle. Characteristic symptoms, in order of appearance, were a listless attitude lasting several days, a period of 1-3 days during which there was more or less continuous walking with occasional spasms of cerebral excitement, exhaustion and death. Diarrhoea and severe straining, sometimes resulting in eversion of the rectum, occurred during the last few days.

P.M. findings regarded as typical included distended gall bladder, a cirrhosis of the liver and albuminous degeneration of the kidneys. The extensive hepatic cirrhosis found in the field cases was not produced by experimental feeding.

There were indications that drying the plant reduced the toxicity, which varied in different areas. Goats and sheep appeared to be more resistant than cattle to the toxic principle.—H. PAVER.

NORDSKOG, A. W., & CLARK, R. T. (1945.) Ergotism in pregnant sows, female rats and guinea pigs.—*Amer. J. vet. Res.* 6. 107-116. 2587

Field reports from several counties in Montana during the spring of 1943 indicated that the feeding of cereal grain contaminated with ergot was associated with deaths of piglets, deaths apparently being due to the inhibition of lactation in the sow.

The authors describe the effect of barley ergot in the reproductive performance of sows, white rats and g. pigs. Nine sows fed 0.5 or 1.0% barley ergot for 25-87 days farrowed 83 pigs, 38 being born alive but dying shortly after birth. There was almost complete lack of udder development and no evidence of milk secretion.

In control sows on regular feed there were normal udder development and milk secretion. In three sows fed varying amounts of ergot during the early part of pregnancy and then given an ergot-free ration from 11-45 days previous to farrowing there were definite udder development and milk secretion at farrowing time. With rats, no young were produced on rations containing 0.1% or more ergot during the first 12 days or more of pregnancy. Rats given a normal diet for the first 12 days and then a ration containing ergot produced young which died shortly after birth.

G. pigs were apparently not affected by the addition of 1.0-3.0% of barley and rye ergot to the diet and produced normal litters.—H. PAVER.

ROBIN, V., & CHARTON, A. (1945.) L'envenimation du cheval par les piqures d'abeilles. [The toxicity of bee stings in the horse.]—*Rec. Méd. vét.* 121. 289-298. 2588

A draught horse was badly stung by a swarm of bees about the head, neck, shoulders and hindquarters. After first aid had been administered the animal was taken to hospital for further treatment and observation. In addition to the oedematous areas found around the punctures and particularly round those near the eyes and face the horse showed extensive haemolysis of the blood and a marked haemoglobinuria. Later a pronounced icterus of the buccal mucosa was observed. Treatment consisted of intravenous injections of hexamine and subcutaneous injections of camphor and caffeine. Each sting site was surrounded by a small nodule, firm to the touch, yielding a slight serous exudate on pressure. These gradually became suppurative, and healed slowly. The icterus was noticed for a fortnight, and the haemoglobinuria gradually became less marked and cleared up in about the same time. The animal recovered its appetite but remained in a weak condition for some considerable time.

The authors discuss at length the effects of stings in general, their comparative effects on different species and the methods of treatment.—A. EDEN.

## PHARMACOLOGY, THERAPEUTICS AND DISINFECTION

SALLE, A. J., & JANN, G. J. (1945.) Subtilin—an antibiotic produced by *Bacillus subtilis*. I. Action on various organisms.—*Proc. Soc. exp. Biol., N.Y.* 60. 60-64. [Authors' summary slightly amended.] 2589

Subtilin, the antibacterial product obtained from *Bacillus subtilis*, was found to be active chiefly against Gram-positive bacteria. Two notable exceptions to the rule were *Neisseria catarrhalis* and *N. gonorrhoeae*, both Gram-negative, but also antagonized by subtilin. Acid-fast organisms, including *Mycobacterium tuberculosis*, were also found to be susceptible to the antibiotic. The agent produced a bacteriostatic action in high dilution and a germicidal effect in greater concentration. A number of pathogenic higher fungi were also found to be susceptible to subtilin. The subtilin was prepared by the Biochemical Division of the Western Regional Research Laboratory, Albany, California, but the method of preparation is not described.

I. FOSTER, J. W., & WOODRUFF, H. B. (1946.) Bacillin, a new antibiotic substance from a soil isolate of *Bacillus subtilis*.—*J. Bact.* 51. 363-369. 2590

II. WOODRUFF, H. B., & FOSTER, J. W. (1946.) Antibacillin, a naturally occurring inhibitor of bacillin.—*Ibid.* 371-380. 2591

[Authors' summaries copied verbatim.]

I. A new antibiotic, bacillin, has been obtained from a soil isolate of *Bacillus subtilis*. Bacillin is highly active against gram-negative and gram-positive bacteria in certain media. Its differentiation from known antibiotics from similar bacteria, the conditions relating to its production in solid and in liquid media, the purification procedure for obtaining highly potent concentrates, and some chemical properties are described. Crude bacillin concentrates are moderately toxic for mice and completely ineffective in protecting the animals from virulent bacterial infections. The presence in the medium of blood and other complex natural materials reduces or abolishes the antibacterial properties of bacillin.

II. Naturally occurring complex organic materials contain an organic substance, herein named "antibacillin", which counteracts the antibacterial action of the antibiotic bacillin. Inorganic salts and  $H_2S$  also have this property. Antibacillin is liberated on hydrolysis of gelatin or casein. It does not destroy or combine with bacillin but probably acts competitively with the latter for vital systems in susceptible bacteria. The chemical properties of antibacillin are given as well as details for the preparation of concentrates of the active fraction from gelatin and from *Penicillium notatum* mycelium.



FORGACS, J., KORNEGAY, G. B., HENLEY, T. F., REDMON, C. F., COLLINS, L. A., & CHAMBERS, M. C. (1946.) Studies on streptomycin. I. Assay in body fluids.—*J. Lab. clin. Med.* 31. 514-522. 2592

KORNEGAY, G. B., FORGACS, J., HENLEY, T. F., COLLINS, L. A., REDMON, C. F., & CHAMBERS, M. C. (1946.) Studies on streptomycin. II. Blood levels and urinary excretion in man and animals.—*Ibid.* 523-534. 2593

[Authors' summaries copied *verbatim*.]

I. A method for the quantitative determination of streptomycin and other antibiotics in body fluids has been described in detail.

II. Streptomycin was administered by subcutaneous, intravenous, intradermal, intramuscular, and intraperitoneal injection to the mouse, guinea pig, rabbit, and man, and blood levels of the drug were determined at various intervals after administration. Maximum blood levels appeared from fifteen to sixty minutes following its injection. For maintenance of blood levels, of the drug following one dose, the animal of choice appeared to be, in order, guinea pig, rabbit, monkey, and mouse.

Urinary excretion of streptomycin was followed in two patients on an intensive parenteral therapy course of the drug and in one volunteer receiving the drug orally.

Administration of streptomycin apparently does not affect the count of red or white blood cells. Therapeutic blood levels of the drug could not be obtained by oral administration in a variety of vehicles. Variation of blood levels from a given dose of streptomycin is seen from animal to animal, and during a therapeutic course, the blood level in the same animal varies from day to day. Similar variation is seen in disappearance of the drug from the blood at the end of the drug course. This pattern is also followed in human beings.

HAYS, E. E., WELLS, I. C., KATZMAN, P. A., CAIN, C. K., JACOBS, F. A., THAYER, S. A., DOISY, E. A., GABY, W. L., ROBERTS, E. C., MUIR, R. D., CARROLL, C. J., JONES, L. R., & WADE, N. J. (1945.) Antibiotic substances produced by *Pseudomonas aeruginosa*.—*J. biol. Chem.* 159. 725-750. [Authors' summary copied *verbatim*.] 2594

Methods are described for the production, purification, and isolation of some new antibiotic substances elaborated by *Pseudomonas aeruginosa*.

Analytical data, the physical and chemical properties of these pure crystalline materials, and some of their derivatives are presented. Evidence is presented which indicates that at least four of our substances (Pyo Ib, Pyo Ic, Pyo II, and Pyo III) are structurally related.

In general, the Pyo compounds are active against Gram-positive but considerably less active against Gram-negative organisms.

Preliminary toxicity studies indicate that these substances in the crude and in the pure state are non-toxic in the animal organism.

FURTADO, A. DA R. (1944.) Atividade antibacteriana do *Aspergillus flavus*. [Antibacterial activity of *Aspergillus flavus*.]—*Mem. Inst. Osw. Cruz.* 41. 45-57. [English summary.] 2595

Ten out of 12 strains of *Aspergillus flavus* showed some antibacterial activity towards *Staphylococcus aureus*, an activity which varied with the medium of growth of the fungus.—ISOBEL, W. JENNINGS.

NETER, E. (1945.) Relative susceptibility of staphylococci to the bacteriostatic action of antibiotics.—*Proc. Soc. exp. Biol., N.Y.* 58. 126-128. 2596

By growing strains of *Staphylococcus aureus* in brain heart infusion medium to which different amounts

of antibiotics were added and by noting the inhibition of growth produced by them, it was found that various strains of staphylococci differed in their relative susceptibility to the bacteriostatic action of penicillin, tyrothricin and streptothricin *in vitro*. One strain, less susceptible to penicillin in concentrations of 0.1 and 1.0 units per ml., was completely inhibited by 0.8 and 2.5 mg. % of tyrothricin.—R. R. A. COOMBS.

FOSTER, J. W., WOODRUFF, H. B., & McDANIEL, L. E. (1946.) Microbiological aspects of penicillin. IV. Production of penicillin in submerged cultures of *Penicillium notatum*.—*J. Bact.* 51. 465-478. [Authors' summary copied *verbatim*.] [For part III, see *V. B.* 14. 357; for parts VI & VII, see *V. B.* 18. 166.] 2597

Growth of suitable *Penicillium notatum* strains in shake culture (submerged growth developed by agitation and aeration) leads to the rapid formation of potent penicillin broths. This method of culturing has numerous advantages over surface cultures: the variable factors of diffusion and pellicle formation are eliminated, and growth and metabolic processes are accelerated.

A determining factor in submerged culture work is the selection of a suitable strain of penicillin-producing mold.

Penicillin formation takes place in shake culture in a nearly synthetic medium in which brown sugar supplies certain substances essential for growth and penicillin formation.

Crude organic supplements hasten the development of *P. notatum* and increase the maximum penicillin titer obtained. Corn steep liquor serves as an excellent supplement, provided the reserve acidity of this material is adjusted with NaOH, CaCO<sub>3</sub>, or both. Sugar concentration has slight effect upon penicillin formation. Maximum penicillin formation is obtained after the disappearance of the sugar from the medium.

Other organic supplements, particularly cottonseed meal, promote penicillin formation in the same manner as corn steep.

Evidence is presented that there are two factors promoting penicillin formation, one inorganic ash and one organic in nature. Brown sugar contains both, and cottonseed meal contains at least the organic factor.

Paramount in importance in the production of penicillin in submerged culture is the maintenance of an adequate oxygen supply.

HIRSH, H. L., FEEFER, H. L., & O'NEIL, C. B. (1946.) A study of the diffusion of penicillin across the serous membranes of joint cavities.—*J. Lab. clin. Med.* 31. 535-543. [Authors' summary copied *verbatim*.] 2598

Penicillin will diffuse across the serous membranes of joints when given systemically or intra-articularly. Low concentrations of penicillin in the joint fluid following the systemic administration and in the blood following intra-articular injection were obtained in a significant number of studies.

HOBBY, G. L., & DAWSON, M. H. (1946.) The effect of sulfonamides on the action of penicillin.—*J. Bact.* 51. 447-456. [Authors' conclusions copied *verbatim*.] 2599

The combination of penicillin and sulphadiazine produces, at times, a greater bacteriostatic effect *in vitro* than the same concentration of sulphadiazine or penicillin alone. However, specific experimental conditions are necessary to produce this effect.

LAWRENCE, C. A., & GOETCHIUS, G. R. (1945.) The *in vitro* antibacterial effects of sulfanilamidoindazoles.—*Proc. Soc. exp. Biol., N.Y.* 58. 356-358. 2600

The 3-, 5-, 6- and 7-isomers of sulphanilamido-indazole were tested against a variety of organisms, against most of which the antibacterial activity was found to be comparable to that of sulphathiazole and sulphadiazine. Against members of the brucella group, however, the 3-, 6- and 7-isomers were found to be bacteriostatic at dilutions of 1:100,000 and bactericidal at 1:2,500 to 1:10,000, whereas sulphathiazole and sulphadiazine were only bacteriostatic at 1:16,000 to 1:32,000 and showed no bactericidal activity even in concentrations of 0.1%. 5-sulphanilamido-indazole was rather less active than the other isomers but was more active than sulphathiazole and sulphadiazine.

—H. S. McTAGGART.

BEUVERY-ASMAN, A., KLARENBECK, A., & VEENENDAAL, H. (1941.) Verband tusschen de concentrate van sulfanilamide in het bloed, de dosering en de wijze van toediening. [Relation between the blood sulphanilamide concentration, dosage and the method of administration.]—*Tijdschr. Diergeneesk.* 68, 413-421. [English, French and German summaries.] [Abst. from English summary.] 2601

To obtain a sufficient concentration (at least 5 mg. %) of sulphanilamide in the blood of dogs, the authors recommend the following dosage: (a) for oral or rectal administration, 100 mg. per kg. body weight daily, yielding 5-8 mg. % for eight hours, or 200 mg. daily for a few days, yielding 5-16 mg. % for 12 hours, or 100 mg. three daily with an interval every third day, yielding a constant concentration above 5 mg. %; (b) for subcutaneous inoculation, 200 mg. per kg. given daily in Petit's solution for a few days, yielding 5 mg. % for at least 12 hours.

GRAF, H. (1943.) Uebersicht über die Sulfanilamide in der Tiermedizin. [I, II, III.] IV & V. [Sulphanilamide in veterinary medicine. I, II, III, IV & V.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* May 14th. 140-143. May 28th. 164-166 & Sept. 17th. 321-325. 2602

I & II. These short introductory sections give a description of the sulphonamides and some chemical formulae in illustration.

III. The pharmacology of sulphanilamide and some derivatives is discussed, including their absorption, excretion and other physiological effects in domestic animals.

IV. G. discusses local therapy and infections which respond to sulphonamides, the activity of the sulphonamides applied in various physical and pharmaceutical forms, and indications for treatment of local infections, fresh and old wounds and surgical wounds, with some applications to veterinary medicine. [This review is somewhat uncritical: the local use of sulphonamides is advised for old purulent wounds, which are better treated with acridines, and for many types of contaminated skin disease lesions in small animals, e.g., external otitis, no reference being made to better agents.]

V. In this section on internal infections, the following diseases are said to respond to oral or parenteral sulphonamide therapy:—infectious bronchitis in its early stage, strangles, purpura, streptococcal encephalomyelitis [of French writers] and puerperal infections in horses, and joint-ill in foals; streptococcal mastitis, broncho-pneumonia, a certain form of shipping fever, calf septicaemia and diarrhoea and acute genital infections in bovines; heartwater, rickettsial conjunctivitis and pneumonia in sheep and goats and joint-ill in lambs; acute catarrhal gastro-enteritis and acute genital infections in pigs; acute tonsillitis, distemper (for the bacterial complications), pneumonia, acute metritis and acute urinary tract infections in dogs; infectious gastro-

enteritis and possibly distemper in cats; infectious coryza (prophylaxis) and coccidiosis in poultry, and snuffles in rabbits. [Much of the literature used by G. is continental and concerns drugs used in Europe but not elsewhere.]—J. E.

SMITH, M. I., JACKSON, E. L., & McCLOSKEY, W. T. (1946.) Sulfones in experimental tuberculosis. Chemical constitution and chemotherapeutic action.

—*Amer. Rev. Tuberc.* 53, 589-593. [Spanish summary.] [English summary copied verbatim.] 2603

Four new sulfones were tested for chemotherapeutic activity in experimental tuberculosis in comparison with promin. None of these compounds showed a degree of activity even approaching that of promin. The results indicate that carboxyalkyl or hydroxy substituents in the amino group reduce activity, that a sulfamyl substituent in the benzene nucleus of diaminodiphenylsulfone reduces absorbability, toxicity and activity, and that at least one free or potentially available amino group in the benzene nucleus of diaminodiphenylsulfone is essential for activity.

BUSH, M. T., DICKISON, H. L., WARD, C. B., & AVERY, R. C. (1945.) Antibiotic substances active against *M. tuberculosis*.—*J. Pharmacol.* 85, 237-246. [Authors' summary copied verbatim.] 2604

A mold identified as a strain of *Aspergillus flavus* Link has been isolated and when grown on a peptonelactose medium has been found to produce a culture fluid which inhibits *M. tuberculosis*, *S. aureus*, and *E. coli* *in vitro*.

Antibiotic material has been extracted from this culture fluid at low pH by organic solvents (benzene or heptane).

This extract yields a mixture of organic acids which has antibiotic activity *in vitro* against a wide variety of both gram negative and gram positive bacteria, and against a number of acid-fast organisms. Activity is also shown against a strain of *monilia*. The properties of the crude antibiotic material are very similar to those described for aspergilliacid.

Fractionation procedures involving multiple extractions and recrystallizations have led to the isolation of an apparently pure aspergilliacid-like substance, m.p. 96.5-97.5° corr., in 5% yield, and a fraction m.p. 118-121° having about 75% the antibiotic activity, the same neutralization equivalent (230) and pK' (5.5) as the substance of m.p. 96.5-97.5.

There is good evidence that at least one other somewhat less stable antibiotic substance is present in the crude mixture.

All these fractions seem to have a similar antibiotic activity against *S. aureus*, *E. coli* and *M. tuberculosis*, and the addition of blood to the medium greatly reduces this activity. The activity is not reduced by spinal fluid.

Studies on impure material have shown that the toxic effects and the antibiotic activity disappear rapidly after systemic or intrathecal administration (mice, dogs) and that antibiotic material is excreted in urine (dog) in very small amount.

AVERY, R. C., & WARD, C. B. (1945.) The inhibitory effect of atabrine and some acridine derivatives upon acid-fast bacilli *in vitro*.—*J. Pharmacol.* 85, 259-264. 2605

Studies made of the growth of seven types of acid-fast bacilli on nutrient agar and glycerin agar to which were added varying concentrations of three acridine derivatives (including atabrine) revealed marked inhibition of growth in all cases. Further trials carried out with a fast-growing strain of *M. tuberculosis* (human type), with varying amounts of 16 acridine derivatives added to both nutrient and glycerin agar, again led to



a pronounced inhibition of growth with at least six of the derivatives, including atetrin, a product whose non-toxicity to human beings is already well established. Certain of the derivatives showed a greater inhibitory effect than that of atetrin, notably 3-chloro-9-(4'-diethyl amino-1'-methyl) butylamino acridine hydrochloride, and further work is in progress to investigate these particular compounds at greater length.—A. EDEN.

QUEEN, F. B., & QUORTRUP, E. R. (1946). Treatment of *Pasteurella Multocida* (fowl cholera) infection in wild ducks with autogenous bacterin and penicillin.—*J. Amer. vet. med. Ass.* 108. 101-103. 2606

Five ducks were inoculated twice with an interval of seven days with 0.5-1.0 ml. of a heat-killed culture of *Past. aviseptica*. Seven days after the second injection, a massive infecting dose of live organisms failed to infect four of the five birds.

Penicillin was given intramuscularly to ducks one hour after oral infection with live organisms and again every four hours for 21 hours. The birds died 2-4 days after discontinuation of treatment, although controls died within one day of infection. In a further experiment, treatment was continued for 60 hours and an additional dose was given on the eighth day. Two of three ducks survived, the third dying on the eighth day.

The authors suggest that the second treatment should continue until all organisms have left the digestive tract, where they are not affected by the penicillin, and that this may take less time if the penicillin is given continuously.

They also suggest simultaneous treatment with penicillin and autogenous bacterin.—R. M. LOOSMORE.

WINSTON, R. (1946). Penicillin sensitivity of *Bact. typhosum*.—*Lancet*. 251. 113-114. [Authors' summary copied verbatim.] 2607

The sensitivity of sixty-six strains representing sixteen different phage types of *Bact. typhosum* has been examined. There was a considerable variation in sensitivity which was independent of the phage type. Most of the organisms required 5-10 units of penicillin per c.c.m. to inhibit their growth for twenty-four hours.

The inhibitory effect of penicillin was also investigated in mice inoculated intraperitoneally with virulent typhoid organisms. Retardation of growth of the organism was recorded as judged by the longer time taken before death and the higher recovery-rate of penicillin-treated animals.

BRYAN, C. S., & YOUNG, F. W. (1945). Phemerol as treatment for ringworm in calves.—*M[ich.] St[.] C[oll.] Vet.* 5. 118-119 & 122. 2608

Following on the favourable reports of SCHLOTT-HAUER (1934), the authors conducted two small trials of phemerol as a therapeutic for ringworm in calves. The first trial was in a calf: one application of phemerol in a 1:1,000 aqueous solution was given. Response to this treatment was slow and the authors then applied the drug twice weekly, after which the condition cleared in about a month.

In the second trial, 13 calves were given applications of phemerol twice weekly for three weeks and cure was complete in a month. In a further group of eight calves similar good results were also obtained. Phemerol is para-tertiary-octyl-phenoxy-ethoxy-ethyl-dimethyl-benzyl-ammonium chloride monohydrate and has also been used in the treatment of chronic streptococcal mastitis [see *V. B.* 15. 339].—A. H. HOGG.

DEWEY, H. M., & WORMALL, A. (1946). Studies on suramin (antypol: Bayer 205). 5. The combination of the drug with the plasma and other proteins.—*Biochem. J.* 40. 119-124. [Authors' summary

copied verbatim.] [For previous parts, see *V. B.* 10. 554.] 2609

A further study has been made of the combination of suramin with the serum proteins. This combination is of a firm nature, and after long extraction with various solvents these suramin-protein complexes still contain very appreciable amounts of the drug.

Suramin readily combines with other proteins such as casein and gelatin. Suramin hydrolyzed by HCl does not combine to any appreciable extent with serum proteins; with casein there is some combination, but the amount of amine attached is very much less than the amount of unhydrolyzed suramin which combines with this protein under similar conditions. The injection of hydrolyzed suramin into a rabbit does not lead to any increase in the 'total amine' contents of the organs and other tissues of the body. Suramin injections are followed by a marked increase in these values, as was described in earlier reports.

CHEN, G., GEILING, E. M. K., & MAC HATTON, R. M. (1945). Trypanocidal activity and toxicity of antimoniales.—*J. infect. Dis.* 76. 144-151. [Authors' summary copied verbatim.] 2610

The trypanocidal activity of antimonials has been investigated in mice infected with *Trypanosoma equiperdum* by suppressive and curative treatments.

Two procedures based upon the suppression of the infection and the cure of the disease are described for the assay of the potency of trypanocidal substances. They give similar results in reference to the trypanocidal activity of tartar emetic.

The therapeutic activity of the derivatives of phenyl stibinic acid (stilbamine, stibenyl, neostibosan and neostam), fuadin, antimony-sodium thioglycollate, antihomaline and tartar emetic was found to be in the order as listed,—tartar emetic being the least efficacious. The evaluation of therapeutic activity is based on the ratio of median lethal dose to median curative dose.

BALAZET, L. (1945). Au sujet du traitement de la dourine. Doit-on modifier les règlements sanitaires? [Treatment of dourine].—*Bull. Acad. vét. Fr.* 18. 321-326. Discussion p. 327. 2611

B. quotes the case of a Thoroughbred treated for dourine by the administration of novarsenobenzol, after the method first described by CUICA (1933). The horse was six years old, had a temperature of 38.8°-40.0°C. and oedema of the scrotum and sheath, from the fluid of which trypanosomes were isolated. There was some paralysis of the hindquarters. Blood samples were inoculated into a dog and five rabbits and from the blood of the dog trypanosomes were isolated, although this blood gave negative results upon inoculation into five rats and two g. pigs.

Nine days after the first appearance of symptoms in the horse, 14 g. novarsenobenzol were injected, the dose being repeated on the following day. Three days after treatment was begun the temperature was normal; the oedema disappeared in about ten days. Blood samples taken after recovery proved negative both to the complement-fixation test and upon inoculation into laboratory animals.

According to Tunisian, Algerian and Moroccan regulations, animals affected with dourine must be slaughtered or castrated. The horse treated by B. subsequently sired normal, healthy offspring. On the strength of this, B. appeals for a modification of the regulations together with a more active policy of dourine prevention. Naganol prophylaxis has been successful in stables open to infection. VELU & ZOTTNER suggested that 1 g. given every ten days might be a suitable dose.

—S. M. G.

RADELEFF, R. D. (1946.) Sodium iodide therapy in infectious equine encephalomyelitis.—*J. Amer. vet. med. Ass.* 109. 129-132. 2612

Forty-three cases were treated by the intravenous administration of sodium iodide (optimum dose, 5 g. per 100 lb. body weight). Three (7%) died, but the average mortality from the disease in surrounding districts in the same period was 40%. Most animals responded visibly in 48 hours or less; two of the eight horses that had to be given a second dose died. None of the 40 survivors have so far become "dummies".

—E. COTCHIN.

EATON, M. D., & HANFORD, V. L. (1945.) Effect of the host in action of sulfonamides on elementary-body agents of murine and feline pneumonitis.—*Proc. Soc. exp. Biol., N.Y.* 59. 63-66. [Authors' summary copied verbatim.] 2613

The effect of sulfamerazine on pulmonary infections in mice, hamsters, rats, and cotton rats, and on yolk sac infections in chick embryos with the agents of murine and feline pneumonitis was studied. The drug inhibited the action of the mouse virus in all the species tested and was effective in very small doses, 0.0025 mg per gram of body weight in mice and somewhat larger doses, 0.1 mg/g, in hamsters. With the agent of feline pneumonitis, large doses of sulfamerazine, near the toxic limits, produced moderate inhibition of the lung lesions in hamsters and white rats, slight inhibition in cotton rats, and no effect in mice or chick embryos.

NEAL, P. A., SWEENEY, T. R., SPICER, S. S., & VON OETTINGEN, W. F. (1946.) The excretion of DDT (2,2-bis-(p-chlorophenyl)-1,1,1-trichloroethane) in man, together with clinical observations.—*Publ. Hlth Rep., Wash.* 61. 403-409. [Authors' summary and conclusions copied verbatim.] 2614

This experiment shows that the ingestion of 11 mg. per kg. of body weight of DDT dissolved in olive oil, corresponding to a total dose of 770 mg., did not cause detectable toxic effects in one normal individual. This experiment shows further that, as in rabbits, part of the DDT ingested is metabolized to di-(p-chlorophenyl)-acetic acid (DDA) and excreted with the urine. Under the conditions of this experiment the maximal excretion of this metabolite occurred on the second day; it decreased rapidly on the third and fourth days, and diminished gradually during the subsequent 10 days.

CRAIG, A. H., Jr., & KLECKNER, A. L. (1946.) Tencidal action of di-phenthane-70.—*N. Amer. Vet.* 27. 26-30. 2615

Groups of 20 dogs, 6-9 months old, and known to carry tapeworms, were given a new tenciicide, di-phenthane-70, (2,2'-dihydroxy-5,5'-dichlorodiphenyl methane), at the rate of 25, 50, 100, 150, and 200 mg. in aqueous suspension per kg. body weight, and 10 dogs were given 10 mg. per kg. The 10 mg. and 25 mg. doses were relatively inefficient as shown by P.M. examination, but doses of 50-150 mg. per kg. completely removed tapeworms from 75% of the dogs treated, partially removed them from a further 15% and were inadequate in 10%. 200 mg. per kg. completely removed the tapeworms from 90% of the treated dogs and partially removed them from the other 10%. In tablet form the drug was slightly less efficient than when given in aqueous suspension. P.M. examination of the dogs treated with 20 mg. per kg. in aqueous suspension at intervals from 30 min. to 6½ hours after dosage, showed that 30-40 min. after dosing the tapeworms had become detached and were passing posteriorly in the intestine. Degenerative changes followed and in two hours the tapeworms had passed into the colon and showed evidence of marked degeneration. At 6½ hours

the worms had completely disintegrated and no trace could be found in the intestine.

The minimum lethal dose was shown to be 2.0-3.0 g. per kg. body weight. The symptoms of poisoning seen in the dogs which received 3.0 g. per kg. were nervous tremors, dullness and depression, followed by death after several days. Some toxic symptoms were observed in dogs receiving 2.0 g. per kg. but not in dogs given 1 g. per kg. Repeated doses appeared to have a cumulative toxic effect greater than that of comparable amounts given in a single dose.

The action of the drug against intestinal parasites other than tapeworms was not tested, but ascarids were expelled with the faeces of some of the treated dogs. The action of the drug against ascarids is being studied further.—T. E. GIBSON.

McGAVACK, T. M., ELIAS, H., & BOYD, L. J. (1946.) The influence of dimethylaminoethyl benzhydryl ether hydrochloride (benadryl) upon normal persons and upon those suffering from disturbances of the autonomic nervous system. Preliminary report.—*J. Lab. clin. Med.* 31. 560-574. [Authors' summary copied verbatim.] 2616

The effects of dimethylaminoethyl benzhydryl ether hydrochloride have been studied in normal persons, and in those with widely diverse diseases, most of which have been associated with some disturbance of the autonomic nervous system.

Results of the following determinations were not abnormally altered in any of the subjects by the administration of the drug: basal metabolism, circulation time, renal function, erythrocyte and leucocyte counts, hemoglobin, differential white counts, hematocrit readings, blood urea nitrogen, creatinine, glucose, proteins, cholesterol, alkaline phosphatase, icteric index, van den Bergh reaction, and cephalin flocculation.

An increase in weight occurred in four patients as a result of improvement in their general condition. The majority of subjects showed no change in pulse rate or in blood pressure. Orthostatic hypotension was observed in six subjects. A slight elevation in pulse rate was seen in five patients taking 400 mg. of dimethylaminoethyl benzhydryl ether hydrochloride daily for relatively long periods of time. Pupillary dilatation, accelerated in its appearance but not increased in its amplitude by epinephrine, was observed when the drug was instilled into the conjunctivae. Vital capacity and respiratory rate were uninfluenced by the drug, unless initially lowered as a result of asthma. Capillary permeability was moderately decreased by prolonged treatment with large doses of the alkamine ether compound.

Three of ten subjects receiving the drug intravenously developed mild transient reactions.

Salivary secretion was apparently not influenced by the range of dosage employed throughout these studies. Both free and total gastric acidity were strikingly decreased. The mouth-anus time was not altered in the normal subjects. Abdominal pain was relieved in ten of seventeen patients. The degree of reduction in the size of the histamine skin reactions was roughly proportional to the daily dose of drug administered. For a brief period after the drug was discontinued, the response to histamine was increased. Definite therapeutic effect was obtained from the drug in certain gastro-intestinal neuroses, asthma, functional dysmenorrhea, and dermal allergy.

Untoward reactions to benadryl were of mild degree and of infrequent occurrence. They included dizziness, blurring of vision, weakness, and somnolence. Each disappeared promptly upon discontinuing the drug or decreasing the dose.



LOEW, E. R., & KAISER, M. E. (1945.) Alleviation of anaphylactic shock in guinea pigs with synthetic benzhydryl alkamine ethers.—*Proc. Soc. exp. Biol.*, N.Y. 58. 235-237. 2617

The hydrochlorides of  $\beta$ -dimethylaminoethyl and  $\beta$ -morpholinoethyl benzhydryl ether are markedly effective in alleviating anaphylactic shock in g. pigs. The first compound has the higher therapeutic index. These substances should prove useful in studies dealing with the role of histamine in various physiological mechanisms and pathological conditions.—J. M. R.

FEDOTOV, A. I. (1941.) Insulinoterapiya pri paraliticheskoj gemoglobinemii loshadei. [Insulin therapy of equine myoglobinuria paralytica.]—*Trud. XV Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Diseases of Horses.] pp. 264-268. [See also V. B. 13. 71.] 2618

Comparisons were made of the blood of 17 normal horses and 13 affected with myoglobinuria paralytica. Whereas in normal horses the blood sugar content was 90 mg. % and the blood alkalinity 590 mg. %, in horses affected with myoglobinuria the averages were 218.5 mg. % and 370 mg. % respectively.

Twelve horses recovered out of 13 which during the course of treatment received 500-600 I.U. of insulin (300 I.U. as a preliminary dose repeated next day). The gradual increase of blood alkalinity and decrease of blood sugar after the injection were regarded as favourable signs. The therapeutic dose for a medium-sized horse was found to be 300-500 I.U. Higher doses (600-700 I.U.) produced slight and 900 I.U. considerable toxic effects when given intravenously.—A. M.

BODINGBAUER, J. (1944.) Ueber ein Prophylaktikum gegen das Staupegebiß des Hundes. [A prophylactic against "distemper teeth" of dogs.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* January 7th 3-5. 2619

B. gives his findings on the effects of "vadril" (Bayer) on the growth and development of the permanent teeth and on hypoplasia of the tooth enamel due to distemper. In preliminary tests it appeared that the drug promoted the rapid formation of permanent teeth and enhanced the quality and quantity of the enamel. Seventeen dogs were treated with the drug from the first signs of distemper and no hypoplastic changes were observed, the enamel being better developed than normally. The drug was administered orally, under the mucous membrane of the gums or intramuscularly.—R. A. ROPER.

\*HAASE, W. (1943.) Bissverletzungen, ihre Besonderheiten und ihre Behandlung. [Treatment of human beings bitten by animals.]—*Med. Klinik.* pp. 256-258. [Abst. from abst. in *Zbl. Bakt. I. (Ref.)* 144. 95.] 2620

Bite wounds are serious, as many infective agents are present in animals' mouths. Only very fresh and clean wounds should be sutured; others should be cleaned of debris by surgical methods. Tetanus antitoxin should be given, and sulphonamides given orally and locally are also recommended. The diseases which may be spread by bites are enumerated.—R. A. R.

BARCLAY, T. H. C., CUTHERBERTSON, D. P., & ISAACS, A. (1944.) The influence of metabolic stimulants on wound healing; the influence of thyroid and 2-4-dinitrophenol.—*Quart. J. exp. Physiol.* 32. 309-315. 2621

Dried thyroid gland was fed to rats during the period of healing of skin wounds and significantly reduced the mean time required for healing. The time was still further reduced when the rats were, in addition, given a pre-operational period of thyroid feeding.

0.012% dinitrophenol in the diet reduced the healing time, but larger doses lacked this effect and the weight loss was great. The authors do not consider it wise to attempt to influence the rate of normally healing wounds of patients by such stimulants.—J. M. ROBSON.

I. MARSHAK, A., & WALKER, A. C. (1945.) Effect of a chromatin derivative on the healing of skin wounds.—*Proc. Soc. exp. Biol.*, N.Y. 58. 62-63. 2622

II. MARSHAK, A. (1945.) Healing of experimental skin wounds.—*Ibid.* 63-65. 2623

I & II: Methods of studying the healing of experimental wounds in rats are described. The application to the wounds of a plastic dressing consisting of methacrylate polymers has important experimental advantages.

Filamentous chromatin extracted from rat liver by the technique of CLAUDE & POTTER [V. B. 14. 280] was further treated and from it a white precipitate was obtained which when taken up in saline and applied to the wounds caused the appearance of granulation tissue 1-3 days earlier than in controls; healing was also more rapid. There was no inflammation or irritation and an excess of granulation tissue was not produced.—J. M. R.

DINGWALL, J. A. (1944.) Synergistic mixture of azochloramid, urea and sulfanilamide. Experimental and clinical study.—*Amer. J. Surg.* 64. 323-327. 2624

A wound dusting powder containing 9.5% urea, 5.0% disodium phosphate, 75% sulphanilamide, 10% calcium carbonate, 0.1% azochloramide, 0.2% granulating agent and 0.2% sodium tetradecyl sulphate, showed no apparent tissue toxicity in experimental animals (rabbits and rats). When used in a small number (25) of clinical cases with infected lesions the indications were that the mixture had definite merits and should be given further trial.—R. ALLCROFT.

ALLAN, J. (1945.) A note on ointment bases.—*Mon. Bull. Min. Hlth Emerg. publ. Hlth Lab. Serv.* 4. 242-244. 2625

Improved bases for ointments which render the therapeutic agent more effective and at the same time reduce the inconvenience to the patient can now be supplied by suitable emulsions of the oil-in-water and water-in-oil type. These can be prepared by the use of simple emulsifying machines and made up to any desirable consistency. Originally synthetic emulsifiers of the sulphated or phosphated higher alcohol type, or of oleates or stearates of the ethanolamines were employed, but owing to wartime shortages certain cellulose compounds had to be developed. Of these, one at least has been shown to be outstanding in its capacity to enhance the action of a number of bacteriostatic agents.

Further, many of the base constituents may be mixed to produce varying physical characteristics whilst supplying the same degree of therapeutic action. Ointments can be subjected to a far wider range of temperature without liquefying, and considerable variation of the pH of these bases is now possible. The types of therapeutic agents that can be incorporated are numerous.—A. EDEN.

PAFF, G. H., LEHMAN, R. A., & HALPERIN, J. P. (1945.) Comparison of the toxicity of antiseptics for embryonic tissue and bacteria.—*Proc. Soc. exp. Biol.*, N.Y. 58. 323-326. 2626

A method is described for quantitative comparison, under identical physical conditions, of the toxicity of antiseptics for tissues and bacteria. It consists of a modification of the method of cultivating tissue in roller tubes described by GEY [(1933.) *Amer. J. Cancer.* 17. 752]. Results were found to be reproducible and the following toxic indices are reported: iodine, 0.29;

azochloramide, 0.64; phenol, 2.7; zephiran [a quaternary ammonium salt], 3.4; merthiolate, 3.9; saponified solution of cresol USP XII, 4.1.—H. S. McT.

CRAMER, D. L., & DODD, M. C. (1946.) The mode of action of nitrofuran compounds. I. Action versus *Staphylococcus aureus*.—*J. Bact.* 51. 293-303. [Authors' summary copied verbatim.] 2627

The mode of antibacterial action of 2-(5-nitro)-furaldehyde semicarbazone, 2-(5-nitro)-furyl methyl ketone, 2-(5-nitro)-furoic acid, propyl-2-(5-nitro)-furoate, ethyl-β-2-(5-nitro)-furoacrylate, and 2-(5-nitro)-furfuryl propionate was studied in broth, rabbit blood, and rabbit serum. The activity of these compounds was examined qualitatively and quantitatively by comparisons of population changes in test samples with population changes in control cultures of *Staphylococcus aureus*.

Four compounds were capable of sterilizing the inoculum in broth. This effect was modified by serum and blood as the test medium.

Five compounds are bacteriostatic by reducing the rate of growth; in four cases this may, at the proper concentration, be preceded by a slight bactericidal effect. The influence of concentration and medium was discussed. The possible relations between structure and mode of action were pointed out.

One compound, 2-nitro-(5-nitro)-furaldehyde semicarbazone, was unique in its mode of bacteriostatic action. Activity was shown in the lag phase of growth. The rate of reproduction, once initiated, was unaffected by the compound. Both concentration and medium affect the activity. The possible contribution of structure to this mode of action was discussed.

BUTTERFIELD, C. T., & WATTIE, E. (1946.) Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to chloramine. —*Publ. Hlth Rep., Wash.* 61. 157-192. [Authors' summary copied verbatim.] 2628

Supplementing previous reports providing data on the bactericidal efficiency of free chlorine for coliforms and enteric pathogens, similar results demonstrating the bactericidal properties of the chloramines are now presented. The results represent the averages from 193 series of experiments conducted at (a) pH 6.5, 7.0, 7.8, 8.5, 9.5, and 10.5; (b) two temperature ranges, 2° to 6°C. and 20° to 25°C.; (c) various ratios of chlorine and ammonia nitrogen, and with species of *Escherichia*, *Aerobacter*, *Pseudomonas*, *Eberthella*, and *Shigella*. The materials and procedures used are fully described and the factors concerned in the use of chloramine are briefly discussed.

The results suggest the following conclusions:

1. The length of the time of exposure of the bacteria in water to chloramine and the amount of chloramine present are primary factors governing the rate of bacterial kills. Under favorable conditions, i.e., at pH 7.0 and a temperature of 20° to 25°C., 100-percent kills cannot be expected in less than 20 minutes with chloramine residuals of about 1.2 p.p.m.

2. The hydrogen-ion concentration has a pronounced effect on the bactericidal activity of chloramine, the activity being diminished with each decrease in hydrogen-ion concentration. For instance, if under given conditions at room temperature, 0.8 p.p.m. of chloramine at pH 7.0 produced a 100-percent kill in 40 minutes, then at pH 8.5, under otherwise identical conditions, approximately 120 minutes would be required, and at pH 9.5, 240 minutes, or to produce a 100-percent kill in 40 minutes at pH 8.5, the chloramine residual would need to be increased to about 1.5 p.p.m.

3. A lowering of temperature retards the bacteri-

cidal activity of chloramine. A reduction of 20 degrees in temperature (20°-25°C. to 2°-6°C.) requires 9 times the exposure period, or 2.5 times as much chloramine to produce a 100-percent kill. Thus, when the effect of a high pH water is superimposed on the effect of low temperatures, very marked retardation of bactericidal activity must be anticipated.

4. Under certain conditions some strains of *Eber. typhosa* and *S. sonnei* appear to be slightly more resistant than some strains of *Esch. coli*. However, they were not found any more resistant than the strains of *A. aerogenes* studied.

5. The presence of excessive amounts of ammonia nitrogen (Cl<sub>2</sub>:N ratios to 1:25) did not markedly reduce the bactericidal efficiency of the resultant chloramines.

6. The duration of the contact time (0 to 68 hours), of the chloramine components, chloramine and ammonia, did not alter the bactericidal properties of the chloramine.

7. Chloramines are much less efficient as bactericidal agents than free chlorine. Thus, to obtain a 100-percent kill with the same period of exposure required about 25 times as much chloramine as free chlorine, and to obtain the same kill with the same amounts of chlorine and chloramine under the same conditions required approximately 100 times the exposure period for the chloramine.

BAILLY, J. (1945.) Contribution à l'étude de l'huile de thon. [Antiseptic properties of tunny fish oil].—*Arch. Inst. Pasteur Algér.* 23. 224-231. 2629

Tunny fish oil, a thick brown oil with a strong fishy odour, is a by-product from factories where tunny flesh is salted and cured. It is largely used in Algiers at present by painters for external decoration in place of the expensive and scarce linseed oil. On standing, the oil deposits a heavy layer of cells, debris, etc., but on filtering this through paper a neutral, less viscous yellow oil is obtained.

B. investigated the antiseptic properties of this oil and found it bacteriologically sterile, containing neither aerobes nor anaerobes capable of growing on ordinary culture media. Additions of the oil in concentrations of 1:10 and 1:20 to cultures of *Salmonella typhi*, *S. paratyphi A* and *B* and *Brucella abortus* killed the organisms after 19 hours' exposure. At a 1:20 concentration, *Bacillus anthracis* cultures were killed after three hours but cultures of *B. subtilis* were still viable after 12 days. Concentrations of the oil of 1:10 failed to kill *B. subtilis*, but with concentrations of 1:4 and 1:5 the organisms were inactivated after four days. Tunny fish oil is more bactericidal than cod liver oil for *B. anthracis* and about the same for *B. subtilis*. The antiseptic property rests in the intrinsic quality of the oil and is not a substance diffusing out into the culture medium; moreover, it is heat-stable.

Dosage of rabbits *per os* with the oil showed that relatively high quantities could be given without causing any toxic symptoms or digestive disturbances. Intravenous injections in dogs of up to 2 ml. of the oil produced no ill-effects. The oil has been given to adult human beings, children and even infants without any untoward effects, except in those where a subjective repugnance to oils is followed by vomiting; otherwise no digestive troubles ensue. Intravenous injections in human beings also caused no disturbances. The oil was found to immobilize various species of protozoa.

The discovery that the oil is naturally aseptic, that it possesses powerful antiseptic properties, and that it is innocuous to higher forms of life merits further studies to develop the use of this oil for therapeutic purposes.—A. EDEN.



RAYMOND, W. F. (1946.) Iodine as an aerial disinfectant.—*J. Hyg., Camb.* 44. 359-361. [Author's summary slightly amended.] 2630

Iodine vapour at a readily tolerable concentration of 0.1 mg./cu. ft. of air gives a rapid kill of freshly sprayed salivary organisms at humidities above 50%. At the same concentration dry bacteria are not as readily killed, the killing rate only becoming appreciable above 70% relative humidity.

LIDWELL, O. M. (1946.) Bactericidal effects of the partial irradiation of a room with ultra-violet light.—*J. Hyg., Camb.* 44. 333-341. [Author's summary copied verbatim.] 2631

The process of removal of bacteria from the air of a room of which part only is irradiated with ultra-violet light is discussed.

Formulae are derived for the rate of disappearance of bacteria from the air in such circumstances and for the equilibrium levels reached when bacteria-carrying particles are being continuously introduced into the air at a constant rate. These formulae include terms for the effect of simultaneous ventilation and for the effect of sedimentation of the bacteria-carrying particles.

The results of a short series of tests are compared with those calculated from these formulae and the two found to agree reasonably well on the assumption that the air within both the irradiated and non-irradiated zones is effectively mixed.

Figures are given over a range of humidities for

*See also absts.* 2433 (alkylresorcinols and tubercle bacilli), 2435 (sulphonamides and *p*-aminobenzoic acid), 2452 (intestinal flora and sulphonamides), 2454 (antibiotic from *Staph. aureus*), 2504 (fouadin in dirofilariasis), 2508 (tumour therapy), 2519 (oestradiol in canine eczema), 2520 (B vitamins in neuritis), 2556-2558 (hormone therapy), 2577 (arsenic trioxide), 2580-2582 (D.D.T.), 2664 (phytoncides).

## HYGIENE, PUBLIC HEALTH AND VETERINARY SERVICES

TROUT, G. M., & HORWOOD, R. E. (1944.) Influence of Balbo-rye pasture on the odour of milk.—*Quart. Bull. Mich. agric. Exp. Sta.* 27. 39-47. [Authors' summary slightly amended.] 2633

The results of the studies and observations reported herein indicate that Balbo rye pasture does not have an adverse effect on the odour of milk as does common rye. The offensive odour characteristic of milk from cows pastured on common rye at certain stages of its growth, variously described as neutralizing, soapy, or even fishy, was not noted in milk from cows pastured on Balbo rye. The characteristic off-odour in milk from cows pastured on Balbo rye may be described as slightly grassy and resembles somewhat that of milk from cows just taken from blue-grass pasture.

HOLTON, W. H. (1945.) Smithfield—mart for world's meat.—*Vet. Med.* 40. 258-260. 2634

This short account traces the history for more than 800 years of the Smithfield meat market, the largest in the world, and describes the difficulties and dangers encountered at the market during the recent war. Before the war four-fifths of the mutton and lamb from Australia and New Zealand and half the frozen meat from these countries as well as half the meat from South America were handled there. The cold storage premises can accommodate 6,000,000 carcasses of mutton.

—D. S. RABAGLIATI.

SCHÖNBERG, F. (1944.) Zur Beurteilung von Geruchsabweichungen bei Rotwurstkonserven. [Odorous sausages.].—*Z. Fleisch- u. Milchhyg.* 54. 135-136. 2635

Variations of odour occur most frequently in red sausage preserve. They are always most noticeable immediately after the sausage has been cut, or the tin opened. Two kinds of odour are found: a sharp,

the sensitivity of salivary organisms to ultra-violet irradiation when suspended as small particles in the air.

A chart is presented for the evaluation of the mean radiation intensity within a rectangular volume produced by a point source situated within or on the boundaries of the volume.

\*HEINEMANN, B. (1945.) Anti-bacterial properties of some mercurials from aliphatic glycols.—*J. Amer. pharm. Ass. Sci. Edit.* 34. 25-27. [Author's abst. in *Biol. Abstr.* Sect. F. 19. No. 5. 26, slightly amended.] 2632

The ratios of solubility in benzene to solubility in water ( $K_D$  value) of three series of mercurials, a total of 15 compounds, prepared from aliphatic glycols, were compared with their bacteriostatic concentrations in nutrient broth, agar-cup zones of inhibition and bactericidal dilutions using *Staphylococcus aureus* No. 209 as the test organism. In general, the more water-insoluble were members of a given series, the better their antibacterial powers. The distribution coefficients and the antibacterial activity could be changed by altering the ratio within a molecule of -OH and -O- to the -CH<sub>2</sub> groups. In the series of mercurials studied, the addition of oxygen-bearing groups lowered the  $K_D$  value and decreased the antibacterial activity, while the addition of -CH<sub>2</sub> groups tended to raise the  $K_D$  value and increase the activity. The placing of substituents on the aliphatic chain had a marked effect on the  $K_D$  value and the antibacterial activity.

sweaty one, and a musty one. Experiments showed that the first is due to the odour developing whenever fresh blood is boiled: the fresher the blood used (both cattle and pig blood was tested), the more noticeable the odour immediately after the containers were opened, but it always disappeared after exposure in the open air. The contents were perfectly all right otherwise, neither appearance nor taste being affected.

The musty odour, however, did not disappear after exposure; it even increased when the preserve was heated. Experiments showed that its occurrence was always due to the use of either slightly putrid meat, or of old and unscientifically preserved blood. Usually such preserve had also a bitter or mouldy taste. Microscopical examination showed an increased content of Gram-positive and Gram-negative bacilli.—GERTRUDE HUEHNS.

GILLESPIE, E. H. (1946.) A case of food poisoning in man probably caused by the consumption of a duck's egg. (Further report.)—*Mon. Bull. Min. Hlth Emerg. publ. Hlth Lab. Serv.* 5. 157-158. [Author's summary copied verbatim.] 2636

*Salm. typhi-murium* Vi-phage Type 2 was isolated from the blood and faeces of a patient dying of acute gastro-enteritis following the consumption of a duck's egg. The same Vi-phage type strain was isolated from some of the eggs, the ovaries and the intestinal tract of the ducks composing the flock from which the egg was obtained.

VAN OIJEN, C. F. (1940.) "Gepasteuriseerde" bevroren eieren. Een belangrijke hygiënische verbetering. [Pasteurization of frozen eggs an important hygienic measure.].—*Tijdschr. Diergeneesk.* 67. 686-696 & 697. [English, French & German summaries; abst. from English summary.] 2637

Before preservation by freezing, eggs should be pasteurized by heating for 20 min. at 65°C. after the addition of a suitable anti-coagulant. Pasteurization should be tested by the amylase reaction. The frozen product should be examined for *Salmonella* and *Bacterium coli* and for the number of bacteria per ml.

WINTER, A. R., STEWART, G. F., McFARLANE, V. H., & SOLOWEY, M. (1946.) Pasteurization of liquid egg products. III. Destruction of salmonella in liquid whole egg.—*Amer. J. publ. Hlth.* 36. 451-460. [Authors' summary copied verbatim.] [Parts I & II in press.] 2638

Temperatures and times necessary to destroy *Salmonella* organisms suspended in liquid egg and heat treated in a laboratory model pasteurizer were investigated. Each inoculum was prepared by compositing portions of 1 to 4 day old cultures of six to thirteen strains of a given *Salmonella* type. One hundred and sixty-four strains representing 16 *Salmonella* types commonly found in egg powder were used in the pasteurization tests.

*Salmonella* organisms were not difficult to destroy in the pasteurization unit. *S. senftenberg* and *S. cerro* were the most resistant types, and *S. pullorum* the least resistant. *S. senftenberg* which did not darken Kligler's iron agar were more resistant than those which produced a darkening of the medium.

With the two exceptions noted, the *Salmonella* types (*S. pullorum*, *S. oranienburg*, *S. montevideo*, *S. tennessee*, *S. anatum*, *S. bareilly*, *S. typhimurium*, *S. meleagridis*, *S. london*, *S. newington*, *S. derby*, *S. rubislaw*, *S. oregon* and *S. kentucky*) were destroyed in liquid whole egg at 150°F. within 0-3 minutes, at 148°F. within 0-8 minutes, at 146°F. within 0-8 minutes, at 144°F. within 1-2 minutes, at 142°F. within 2-0 minutes, at 140°F. within 2-6 minutes, and at 138°F. within 3-7 minutes.

FOLEY, J. (1944.) Horse transport and diarrhoeal diseases.—*Brit. med. J.* Feb. 12th. 244. 2639

In this note F. suggests that the increase in horse transport in certain cities during the war is responsible for an increase in diarrhoeal diseases in children. He asserts that deaths from these diseases increased in just those cities where horse transport increased and assumes that the fall in their incidence previously coincided with the increase of mechanical transport. He considers that horse dung in the streets, not swept up because of the labour shortage, produced a breeding ground for flies conveying disease.—D. S. RABAGLIATI.

PERKINS, J. E. (1945.) Evaluation of methods to control air-borne infections.—*Amer. J. publ. Hlth.* 35. 891-897. 2640

This general article serves as an introduction to the work of a committee set up to evaluate methods of control of air-borne infections. P. gives a brief history of the changing attitude towards air-borne infection, from the days when the miasma theory held sway until the present when it is regarded as largely a matter of exhaled droplets and droplet nuclei. The size of the droplet nuclei, which evaporate and remain suspended indefinitely, is under 0.1-0.2 mm. in diameter. Measures of control must include the use of physical barriers to the inhalation of such infectious droplets, such as masks, filters, etc., and the disinfection of the atmosphere containing these particles by disinfectant vapours and various forms of disinfectant radiation.

—D. L. HUGHES.

— (1946.) A study of the effect of oiled floors and bedding on the incidence of respiratory disease in new recruits. [The Commission on Acute Respiratory Diseases and the Commission on Air-Borne Infec-

tions].—*Amer. J. Hyg.* 43. 120-144. [Summary copied verbatim.] 2641

A study of the effect of oiling floors and bedding on the incidence of respiratory diseases was conducted in a large replacement training center at Fort Bragg, N.C., during the winter of 1944-1945. The application of oil both to floors and blankets was simple and practical under the conditions of this army post. The procedures were generally popular among both officers and enlisted men. They resulted in greater ease of cleaning barracks and almost total absence of dust.

Throughout the period of the study the oiling procedures effectively controlled the degree of bacterial contamination of the air in treated barracks. During a period of low endemic occurrence of respiratory disease there was suggestive evidence that the procedure reduced the incidence of hospitalized illness. During the epidemic occurrence of acute undifferentiated respiratory disease, however, the procedure had little or no effect.

Hemolytic streptococcal infections and other respiratory diseases of known etiology did not occur with sufficient frequency for the effect of the oiling procedures to be evaluated.

PUCK, T. T., ROBERTSON, O. H., WISE, H., LOOSLI, C. G., & LEMON, H. M. (1946.) The oil treatment of bedclothes for the control of dust-borne infection. I. Principles underlying the development and use of a satisfactory oil-in-water emulsion.—*Amer. J. yg.H* 43. 91-104. 2642

LOOSLI, C. G., WISE, H., LEMON, H. M., PUCK, T. T., & ROBERTSON, O. H. (1946.) The oil treatment of bedclothes for the control of dust-borne infection. II. The use of triton oil emulsion (T-13) as a routine laundry procedure.—*Ibid.* 105-119. 2643

[Authors' summaries slightly amended.]

I. Two oil-in-water emulsions are described, both of which can be used to deposit mineral oil in sheets and blankets in amounts appropriate for preventing the dispersal of dust and bacteria from them into the air. The emulsions are nontoxic and nonirritating to the skin, and can be readily applied to bedclothes in the course of the ordinary laundry procedure. One of these, a triethanolamine oleate emulsion, presents some difficulty in routine use because of its tendency to separate when stored in drums, and to rancidify in blankets. The other emulsion (T-13) uses Triton NE [a 30% solution of a substituted phenyl ether of polyethylene glycol] as the emulsifying agent. It is free from both these disadvantages and also permits more accurate control of the amount of oil deposited in the fabrics.

The factors which affect the possibility of fire hazard associated with oil treatment of bedclothes are discussed and conditions defined under which the process may be safely carried out.

Neither bactericidal substances alone nor water-soluble dust-laying agents are as effective as mineral oil in preventing aerial dissemination of bacteria from contaminated bedding.

A simple apparatus for testing retention of dust and bacteria by fabrics is described.

II. Details of a process for treatment of cotton and woollen bedclothes, wearing apparel, and other fabrics with a Triton oil emulsion (T-13) are presented for use in the control of dust-borne infections. The procedure is easily incorporated into the standard laundry routine, and results in a very uniform and easily controlled deposition of oil throughout the textiles which is not appreciably affected by changes in pH, temperature, or by small variations in concentration of the oil emulsion used. The treatment is inexpensive.



Washing removes a certain percentage of the oil from cotton fabrics, so that after each laundering it is necessary to re-treat such materials, using a very dilute emulsion.

On the other hand, woollens lose very little or no oil in washing and may not require subsequent treatment. However, studies to date have not extended over a sufficient period of time to determine how long a once oiled blanket will retain its bacteria- and dust-holding properties following repeated washings. It has been found that re-treatment of blankets in a 0.15 per cent oil emulsion for as many as 7 times can be safely undertaken. Oil deposited in woollen fabrics by the process here described can be removed completely by dry cleaning.

Oil-treated fabrics are indistinguishable in appearance and texture from untreated ones, and are nonirritating and odorless. Tests wherein thousands of individuals have slept for many months in bedclothes treated by this process have revealed no objectionable features. Oil-treated bedclothes retain their ability to prevent dissemination of dust and bacteria into the air for long periods of time, particularly when dust control measures (oil) are applied to the floors as well.

TS HEINKEPE. (1943.) Der niederländische Veterinär-dienst. [The Dutch Veterinary Service.]-*Tierärztl. Rdsch.* 49. 105-106. 2644

The organization of the Dutch Veterinary Service is based on the Contagious Diseases (Animals) Act of March 26th, 1920. The duties of the Service are to care generally for the health of the animal population, to control epizootics, to combat rabies among cats and dogs and to inspect all meat and livestock intended for export. Other acts deal with the prevention of contagious diseases in fowls, and with warble flies. The service comes under the Ministry of Agriculture and Fisheries, except for meat inspection which is controlled by the Department of Public Health in the Ministry for Social Affairs. The Director of the Service is at the same time Veterinary Chief Inspector of Public Health. The country is divided into ten veterinary districts, each under an inspector who is also an inspector of public health. There are also two general inspectors, one of them dealing especially with TB. of cattle.

The law gives details for the control of the following contagious diseases: rinderpest, bovine contagious pleuropneumonia, foot and mouth disease of all ruminants, anthrax of all animals, rabies of all animals, mange of sheep, goats and equines, pox of sheep and goats, and glanders in all equines. The place, stable or pasture where the disease occurs, must be notified; sick or suspected animals may not be transported, but must be isolated and treated. The first Dutch Animals Act passed in 1870 and valid until 1922, successfully eliminated rinderpest, bovine contagious pleuropneumonia and sheep pox, and to a large extent, also glanders.

The Dutch Veterinary Service includes three research institutions: the Institute for Parasitic and Contagious Diseases in the Faculty of Veterinary Science in Utrecht, the State Serum Institute in Rotterdam and the Veterinary Public Analyst's Office in Amsterdam. The Serum Institute produces prophylactic and therapeutic sera and vaccines, and diagnostic preparations; it also undertakes research. The Amsterdam Office deals particularly with F. & M. disease. It produces hyperimmunizing and passively immunizing sera. It is a model institute, but does not produce sufficient vaccine for the needs of the country. The author hoped to improve this state of affairs.

The inspection of imports by the Service also covers animal by-products, such as bone meal, even when they

are only used as manure. The inspection of all livestock and meat to be exported guarantees its safety for the foreign buyer.

The Service also gives advice on sanitation and feeding, sometimes working in conjunction with local veterinarians. Although it is led centrally by the Director from the Hague, its worth is felt throughout the country.—GERTRUDE HUEHNS.

DALMATOV, M. (1943.) Nauchno-issledovatel'skaya rabota Omskovo veterinarnovo instituta za 25 let. [Research work of the Omsk Veterinary Institute for the past 25 years.]-*Veterinariya, Moscow*. No. 12. pp. 42-43. 2645

D. reviews the research work of the Omsk Veterinary Institute on the occasion of its 25th anniversary. He describes briefly studies undertaken by each of the faculties of the Institute and gives the names of professors and lecturers, titles of publications, etc. Altogether, 600 books and papers, including 60 dissertations, were published by the Institute during the past 25 years.

The Institute has devoted much time to the study of the reindeer and has created a separate chair of Reindeer Breeding. Of special interest in this connexion is the important work of PROF. AKAEVSKIY on reindeer anatomy.—E. CHERKESI.

SHAPIRO, G. L., & KOZLOV, P. G. (1944.) 20 let Leningradskovo voenno-veterinarnovo uchilishcha Krasnoi Armii. [Twentieth anniversary of the Red Army Veterinary Preparatory School.]-*Veterinariya, Moscow*. No. 2-3. pp. 48-49. 2646

The authors give a short historical sketch of the activities of the school from its foundation in Moscow in 1923. In its early days the School had to overcome many political and economic difficulties; there was lack of suitable accommodation and trained personnel and there were wide-spread epidemics of glanders, anthrax, etc. In 1924 the School was established permanently in Leningrad. It now possessed a library, well equipped laboratories and demonstration rooms, museums and special installations. It publishes its own text-books and can draw for its teaching staff on the military and civil educational institutes of Leningrad. During the war it took part in the defence of Leningrad and released more than 1,200 students and teachers for active service, continuing at the same time its work of training veterinary specialists for the Red Army by evacuating the School across the ice-bound Lake of Ladoga to a new site.—E. CHERKESI.

LIGHTFOOT, G. (1945.) A review of the work of C.S.I.R. 3. Animal health. 4. Animal nutrition. —*J. Coun. sci. industr. Res. Aust.* 18. 89-90 & 90-91. 2647

This series reviews briefly the work of the various divisions of the Council for Scientific and Industrial Research. The section on animal health discusses the development of a vaccine against bovine pleuropneumonia, mastitis and tick fevers in cattle, foot rot, botulism, "black disease" and enterotoxaemia in sheep, and internal parasites. The section on animal nutrition deals with problems of nutrition and wool production, with coast disease (copper and cobalt deficiencies) and with basic metabolic studies on the sheep, especial reference being made to drought feeding. Work on the sheep blowfly, the buffalo fly and the cattle tick is mentioned in the entomology section.—H. McL. GORDON.

—, (1944.) A national water policy. pp. 32. London: H.M. Stat. Off. 8vo. 6d. 2648

This is a report on a national water policy presented to Parliament by the Ministries of Health and of Agriculture and Fisheries and the Secretary of State for

Scotland. The present position is reviewed and suggestions are made for greater ministerial powers, so that supplies may be conserved and distribution improved. The multiplicity of water undertakers is criticized and a more unified control by both the Government and the local authorities is proposed. A special survey is given of the position in Scotland, which differs materially from that prevailing in England. A

See also absts. 2428-2430 (T.B. control), 2448, 2661 (*Br. melitensis*), 2502 (trichinosis), 2578, 2579 (rodent control), 2628 (water supplies), 2663 (milk production and control), 2460 (Vaccine Institute, Basle), 2501 (mange control in Argentina).

## TECHNIQUE AND APPARATUS

BARER, G. (1946.) The rapid detection of gelatin-liquefying organisms.—*Mon. Bull. Minist. Hlth Emerg. publ. Hlth Lab. Serv.* 5. 28-29. [Author's summary copied verbatim.] 2649

One hundred and twenty six strains of Gram-negative and Gram-positive bacilli were tested on Frazier's agar plate medium, containing gelatin for the detection of gelatinase-producing colonies, in parallel with a tube method. The method proved reliable within limits, and frequently gave more rapid results than the tube method. It is most useful for the rapid detection of gelatin-liquefying non-lactose-fermenting Gram-negative coliform bacilli from the intestinal and urinary tracts. The method has so far been unsatisfactory for staphylococci. The incorporation of gelatin in MacConkey and desoxycholate plates gave unsatisfactory results.

MUELLER, J. H., & MILLER, P. A. (1943.) Large-scale production of tetanal toxin on a peptone-free medium.—*J. Immunol.* 47. 15-22. 2650

Details are given for the large-scale production of tetanus toxin. The authors stress the importance of having the optimal concentration of iron in the medium and recommend a concentration of 10-15  $\mu$ g. of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  per 100 ml. The article includes a table giving data for initial titres and antigenicity tests of a number of samples.—A. BUXTON.

WOOD, E. J. F. (1942.) Agar-agar manufacture.—*J. Coun. sci. industr. Res. Aust.* 15. 295-299. 2651

W. summarizes the position of agar production in Australia at the time of writing. Several weeds had been found suitable, the most abundant being *Gracilaria confervoides*. Details are given of the raw material, its harvesting, drying and bleaching and of the manufacturing process. The finished product is not inferior and for some purposes is superior to Japanese agar.

—N. WICKHAM.

WELLER, T. H., & DAMMIN, G. J. (1945.) An improved method of examination of feces for the diagnosis of intestinal schistosomiasis.—*Amer. J. clin. Path.* 15. 496-500. 2652

In a previous investigation [*V. B.* 16. 285] it was shown that when the acid-ether technique was employed for the recovery of *Schistosoma mansoni* eggs from faeces, a number of the eggs were trapped in the stratum of floating debris in the flotation tube. The present work was carried out to ascertain whether the addition of a wetting agent to the hydrochloric acid would reduce the adhesive forces in the debris and thus increase the number of eggs recovered from the faecal sample. It was shown that the addition to the acid-faeces mixture of a 10% solution of "Triton N. E." (a 33% aqueous solution of polyethyleneglycol mono-octyl phenyl

bill is to be presented to Parliament to provide Exchequer grants of £15,000,000 for England and Wales and £6,375,000 for Scotland. The importance of improving rural water supplies is especially stressed.

Part II deals with the River Boards, and appendices are added describing the growth and development of public water supplies, the geological factors and the question of compensation water.—D. S. RABAGLIATI.

ether) markedly improved the efficacy of the technique, but further work is indicated to ascertain the most efficient wetting agent for this purpose and the optimum concentration in which it should be used.—T. E. G.

HORECKER, B. L. (1946.) A primary standard for the colorimetric determination of hemoglobin.—*J. Lab. clin. Med.* 31. 589-594. [Author's summary copied verbatim.] 2653

Standard solutions for the colorimetric determination of hemoglobin by the alkaline hematin method may be prepared from crystalline hemin in N/10 borate buffer at pH 9.4. Stock solutions containing 1 mg. per cubic centimeter must be aged overnight before dilution. These standard solutions give absorption spectra similar to that given by alkaline hematin derived from blood. With a yellow-green filter, 29.6 mg. crystalline hemin per liter of N/10 borate buffer at pH 9.4 will have an absorption equal to that of a blood sample containing 16.7 gm. per 100 c.c., diluted 1:251 in N/10 sodium hydroxide. On a molecular basis, the ratio of absorption intensities is 1:1.14. The accuracy of the alkaline hematin method is 0.2 gm. per 100 c.c.

PITTMAN, M. (1946.) A study of fluid thioglycollate for the sterility test.—*J. Bact.* 51. 19-32. 2654

The use of sodium thioglycollate in a clear medium for the cultivation of anaerobic bacteria was introduced in 1940 by BREWER, with the subsequent recommendation of two formulae, one of which contained meat infusion and the other an extract of yeast. The advantages in the testing of biological products for sterility of a medium containing thioglycollate were its neutralization of the bacteriostatic action of mercurial preservatives and its provision of both aerobic and anaerobic conditions in the same test tube.

P. worked on the development of a medium which would support the growth of the greatest possible variety of bacteria at an optimum temperature. Resazurin in a concentration of 1:1,000,000 was a suitable Eh indicator and in a concentration of 1:250,000 or less it did not retard the development of organisms, whereas methylene-blue in a concentration of 1:500,000 was bacteriostatic. Pancreatic digest of casein was superior to the acid hydrolysate in growth-promoting properties, as was also a water-soluble extract of yeast, and the optimum amounts of these products were 0.5% and 1.5% respectively. A pH of 7.1, together with 0.25 NaCl provided suitable growth conditions for a wide variety of organisms and the addition of L-cystine enabled *Clostridium chauvoei* to develop. Sufficient experimentation was not carried out to determine the optimum temperature of incubation for the sterility test.

—J. C. BUXTON.

See also absts. 2427, 2434 (culture of tubercle bacilli), 2441 (longevity of cultures), 2461 (rabies virus culture), 2464 (chick embryo cultivation of influenza virus), 2473 (virus vaccine production), 2479 (inoculation), 2480 (canary in virus research), 2485, 2486 (bacteriophage), 2568 (puncture sites), 2597 (penicillin production), 2626 (evaluation of antiseptics).



## MISCELLANEOUS

CRUIKSHANK, W. D. (1946.) The scientific method in clinical medicine.—*Brit. med. J.* June 1st. 843-844. 2655

C. deplores the fact that the modern clinician relies too much upon the laboratory diagnosis rather than upon a personal scientific orderly examination of the patient. He points out that it is not the function of the laboratory to make diagnoses and that laboratory findings are as liable to human error as are patient's statements. Diagnosis and the control of the treatment are the responsibilities of the physician and constitute the very basis of scientific medicine: the physician should not deliver himself and his patient entirely into the hands of the non-clinical scientist. C. quotes a shrewd observer who suggested that only two men ever examine the sick patient, the radiologist in the dark and the pathologist after the patient is dead. Too much reliance on the laboratory causes deterioration of clinical ability. Laboratory science cannot be made a substitute for clinical science, although laboratories have their place as an aid in the diagnosis of obscure cases.—D. S. R.

MARTEL, H. (1944.) Escorcheres. Abattoirs. Equar-

riage. [Abattoirs.]—*Bull. Acad. vét. Fr.* 17. 66-76. 2656

M. discusses the historical use and meaning of these words. *Ecorcheur* signifies a flayer, who in earlier times also rendered fat. As a side line the *écorcheur* kept dogs. *Equarissage* is the knacker's trade. Both words date back to old French. *Abattoir* is a modern introduction, replacing *boucherie*.—S. M. G.

\*PAYNE, L. F. (1943.) A list of poultry books. pp. 83. Manhattan, Kans.: Kansas College Press. [Review in *Biol. Abstr.* Sect. F. 19. No. 8. 28, copied *verbatim*.] 2657

A list of about 2500 poultry books available in 16 American libraries which cooperated in this compilation. The bibliography includes poultry books published in English from the earliest available to 1940 inclusive. A number of early books published previous to 1850 are designated and a few rare foreign volumes, together with a list of Poultry Journals and a short subject index, are included. The references are arranged in alphabetical order by authors and keyed so as to indicate the libraries in which each book may be found.

## REPORTS

EIRE. (Undated.) Thirteenth annual report of the Minister for Agriculture 1943-44. pp. vi + 159 + [77]. Dublin: Stationery Office. 3s. 6d. Items of veterinary interest pp. 37-46 & 73-75. 2658

The report includes a description of the activities of the Veterinary College of Ireland. At the opening of the term, 1943-44, there were 31 new entrants and a total of 268 students, of whom 41 obtained their diplomas. An account is given of the various departments and sections of the College of which those of pathology and parasitology are particularly active. A large number of specimens were examined, of which five were from cattle with "cystic haematuria". There is a section in the College which serves as a Government central station for examination of canned meat. The clinical department treated 6,266 animals, 1,018 more than in the preceding year.

A summary is also given of the work of the Veterinary Research Laboratory, where 3,322 specimens were examined during the year for a variety of conditions. 33,752 more vaccine doses were issued than in the previous year.

Experiments were carried out with the American strain 19 *Brucella abortus* vaccine (Group A) and with dried utero-chorionic exudate (*Br. abortus*) (Group B). The results seem to indicate that the vaccine did not produce a high degree of protection when the animals were subjected to experimental infection during pregnancy. The immunity of six pregnant heifers vaccinated intradermally during calfood with a very small dose of virulent *Br. abortus* was, however, tested experimentally during pregnancy and found to be complete. A field experiment with strain 19 vaccine on a herd infected with contagious abortion gave satisfactory results.—D. S. RABAGLIATI.

NIGERIA. (1945.) Annual report of the Veterinary Department for the year 1942. [HENDERSON, W. W.] pp. 6. Lagos: Govt. Printer; London: Crown Agents for the Colonies. 4to. 6d. 2659

ANTHRAX is enzootic in Adamawa and Sokoto Provinces. Outbreaks also occurred again among trade cattle in Kano Province. An extensive outbreak of BLACKLEG in the Cameroons necessitated the posting of a veterinary officer to that territory. Vaccine was

also supplied to the French Cameroons Veterinary Department. 386,951 cattle were immunized.

Sulphapyridine has given favourable results in the treatment of EQUINE EPIZOOTIC LYMPHANGITIS.

STREPTOTHRICOSIS of cattle is of importance owing to its effect on the market value of the hides.

There was an increase in the number of outbreaks reported of TRYPANOSOMIASIS. The extension of cultivated areas tends to force cattle owners to use grazing areas in or bordering on tsetse-fly-infested country. Reservation of grazing areas and the provision of water supplies is advocated. 20,295 cattle were treated.

SPIROCHAETOSIS caused losses among imported poultry and among crosses with these.

FOOT AND MOUTH DISEASE was widespread in Kano and Zaria Provinces. RABIES was widespread throughout the Northern Provinces.

Losses in the Plateau and Bornu Provinces from BOVINE CONTAGIOUS PLEUROPNEUMONIA were severe. 125,113 cattle were vaccinated. A serious outbreak of PLEUROPNEUMONIA of goats occurred in Bornu.

RINDERPEST is still the most important cause of losses. Attenuated goat virus was given a trial at some of the immunization centres. 377,784 cattle were immunized by the serum-virus method and 285,851 received spleen vaccine.

The valuable work of free clinics in the treatment of African-owned horses and donkeys has been continued; cases of cruelty are now far less common. In Katsina, where all donkeys entering the market were inspected, less than 6% required treatment. The training of more Africans will allow further extension of this branch of the Veterinary Service and foster the spread of knowledge of animal welfare. 18,789 patients were treated, and 23,455 bulls and 41,549 goats were castrated and 79,200 cattle, sheep and goats treated for HELMINTHIASIS. The cattle trade has prospered and the demands of overseas markets for hides and skins have increased the output to 840,068 hides. There was a decrease of 800,000 skins exported owing to the ban by the French West African Government on the export of all livestock and livestock products to Nigeria. The appointment of a European Hides and Skins Inspector has been approved.

Details are given also of the Veterinary Department's efforts to increase local food production of bacon, pork, beef, butter and cheese.

Great difficulties were encountered owing to the shortage of European veterinary officers. The scheme for training Africans started with six students.

—J. A. GRIFFITHS.

**TANGANYIKA TERRITORY. (1944.) Annual report of the Department of Veterinary Science and Animal Husbandry for the year 1943.** [LOWE, H. J.] pp. 17. Mpwapwa: The Department. 4to. 2660

In spite of the severe drought during the year there has been little decrease in the stock of the territory, this being ascribed to the ability of zebu cattle to survive when high-producing animals would succumb. The first step in any stock improvement scheme must be the improvement of the country; as the climate cannot be changed, work must be concentrated on pasture improvement and control of erosion. Measures in operation include limitation of the stock population in each area, rotational grazing and the control of tsetse fly. Goat keeping is encouraged in view of their ability to survive in tsetse areas and their service in destroying undergrowth and bush; it is claimed that they are the most profitable domestic animal in the territory. An attempt is being made to breed milch goats for use in tsetse areas.

**TUBERCULOSIS** is prevalent among the Ankole cattle of Bukoba and the zebu cattle of the southern highlands; it has also been recorded in pigs. **ANTHRAX**, **BLACKLEG** and **CONTAGIOUS ABORTION** vaccinations have been undertaken. No cases of **RABIES** were confirmed, but seven cases of **HORSE SICKNESS** occurred at Moshi, where there had been no horses or mules for 15 years; it is thought that a virus-carrier animal must be involved.

**RINDERPEST** in cattle is now confined to the Masai district of the Northern Province and complete eradication is hoped for in the near future. 712,013 cattle were immunized with attenuated goat virus, and 14,985 animals were vaccinated. No further outbreaks in game have been detected south of the central railway for two years; north of the railway the disease has been detected in only two areas. Experimentally infected reedbuck and bush pig were shown to be susceptible. Some progress has been made in the control of **BOVINE CONTAGIOUS PLEUROPNEUMONIA**, triple vaccination with culture being the method of immunization. For trade cattle, hand dressing with wood tar and engine oil or nicotine extract and engine oil, has given good results in the prevention of **EAST COAST FEVER**, the dressing being effective for three days.

Laboratory operations included the preparation of **RINDERPEST**, **FOWL TYPHOID** and **FOWL POX** vaccines, and agglutination tests for **CONTAGIOUS ABORTION**. Animal husbandry activities included work on pasture management, cross-breeding from Indian zebu bulls and karakul sheep, a comparison of the mutton capabilities of Masai sheep and karakul grades, control of stock routes, improvement of hides and skins, and marketing of cattle, butter, cheese and bacon.—U. F. RICHARDSON.

**U.S.A. Report of the Division of Veterinary Science, Michigan State College of Agriculture and Applied Science, East Lansing, 1944.** [GILTNER, W.] pp. 61. 8vo. 2661

The Dean expresses considerable disapproval of the accelerated programme of studies during the war period in which students attended four terms in a year instead of three. The total registration for the veterinary curriculum was 310.

**DEPARTMENT OF PATHOLOGY [HALLMAN, E. T.]—**710 autopsies were performed and 2,017 specimens sub-

mitted for diagnosis. 3,251 tests of blood, faeces, urine and other specimens were also made. The State Pathologist for the Department of Agriculture who has accommodation in the College, made 18 autopsies and examined 72 specimens from animals and 233 meat samples and carried out 20,000 milk tests for **MASTITIS** and 152,273 blood tests for **CONTAGIOUS ABORTION**. 3,668 animals were treated at the abattoir, including tuberculin tests, vaccinations and the taking of blood samples for contagious abortion tests.

**THE HOSPITAL AND AMBULATORY CLINIC [HUTTON, J. P.]—**A total of 14,307 animals were treated, 3,803 of these in hospital: this includes 763 equines, 7,681 cattle, 786 sheep, 1,310 pigs, 3,510 dogs, 233 cats and 21 miscellaneous species.

**[REPORT OF] EXTENSION SPECIALIST—ANIMAL PATHOLOGY [KILLHAM, B. J.]—**36% of samples examined for **MASTITIS** were positive or suspicious. About 25% of cows appear to be infected. Testing and vaccination with strain 19 vaccine against **BOVINE CONTAGIOUS ABORTION** was continued in so far as the reduced numbers of veterinarians permitted. Extensive vaccination of mature cattle is producing a situation which makes control work difficult, since reactors had to be classed as diseased, no matter how reactions were acquired. Fewer cattle were tested; 148,107 cattle had 3.7% reactors. Local veterinarians sent in 141,807 blood samples for testing: 11.7% were positive. The outlook for control at an early date was not good. **EQUINE ENCEPHALOMYELITIS** occurred on 314 farms and 350 horses were affected. Mortality was 95% approximately. 8,000 horses were vaccinated. Outbreaks of **SWINE FEVER** caused losses. Phenothiazine was being used in controlling losses from sheep **HELMINTHIASIS**. Adding traces of cobalt sulphate was advocated for the treatment of unthrifty and debilitated animals in certain areas in the upper Peninsula. Demonstrations were given to farmers on methods of disease prevention and the treatment of farm livestock.

**[REPORT OF] EXTENSION SPECIALIST IN POULTRY PATHOLOGY [WEISNER, E. S.]—**4,174 birds or tissue specimens were received for examination. *Pseudomonas* infection caused severe losses in a large flock of turkeys. **PULLORUM DISEASE** caused serious losses from March to June; in some cases up to 100% mortality occurred. **NUTRITIONAL ROUP [VITAMIN A DEFICIENCY]** was noted in three flocks. Deficiency in pantothenic acid, riboflavin and pyridoxine was noted in a few cases. **COCCIDIOSIS** was prevalent.

**EXPERIMENTAL WORK [HUDDLESON, I. F.]—**The work on **MASTITIS** of cattle and dairy hygiene [BRYAN, C. S.] is reviewed briefly. Immunization studies on g. pigs with *Br. abortus* bacterin showed that if the dose was too large no protection was given. The bactericidal action of plasma against *Br. abortus* is greater than that of serum. The action of whole blood is slight. Heating or filtration of plasma affects its bactericidal value. Species of *Brucella* vary in their susceptibility to the action of plasma. *Br. abortus* is the most susceptible, the rough type more than the smooth. The large collection of cultures of the species of *Brucella* is being maintained and increased. *Br. melitensis* has been isolated from five workers in a meat factory in Iowa engaged in the slaughter of sheep.

**POULTRY DISEASES AND PUBLIC HEALTH BACTERIOLOGY [STAFSETH, H. H.]—**The work in progress is given in outline. The results of 5,548 autopsies are summarized.

**PARASITOLOGY [HAWKINS, P. A.]—***Coccidiosis* in poultry (*Eimeria tenella* infection) develops gradually within the flock until there is an explosive outbreak. There is little danger of perpetuating nematodes on



pasture from one year to the next. Pastures infested with *Haemonchus contortus* are freed in two months in the late summer or early fall, with *Oesophagostomum columbianum* and *Chabertia ovina*, in three and a half months. *Ostertagia circumcincta*, *Trichostrongylus colubriformis*, *Nematodirus* and *Trichuris ovis* larvae were still viable after four and a half months on pasture.

EXPERIMENT STATION.—A serum prepared by the inoculation of 12 lambs with a bacterin prepared from bacteria obtained from the lungs of lambs dying of PNEUMONIA has been found of service in protecting lambs against the disease. In flocks where the serum was used losses were reduced from 65.8% to 36.1%. The serum must be used early in the course of the disease. A survey of lungworms in sheep revealed 45% infected out of 20 animals examined. STIFF LAMB DISEASE is being studied.—J. A. GRIFFITHS.

HOLLAND. (1945). 25e jaarverslag mededeelingen betreffende den gezondheidsdienst voor vee in Friesland, 1 Mei 1943–30 April 1944. [RENGERS E. v. W.] [25th annual report of the Cattle Health Service, Friesland, May 1st 1943 to April 30th 1944.] pp. 35. Wolvega: G. Taconis. 8vo. 2662

In addition to the usual report of the year 1943–44, this publication gives an account of the first 25 years' effort to control disease in Friesland cattle. From the first, great stress was placed on the voluntary basis of the scheme which was introduced in 1919.

MASTITIS has been attacked at different times by the remedies in vogue at the time and results have been similar to those of general experience. During the whole period there has been supervision of milk quality. BOVINE TUBERCULOSIS was the most important disease to control. During the first year only clinical diagnosis to detect open cases was carried out; the next year the ophthalmic single-dose tuberculin test was introduced and in 1922 the test involving two instillations of tuberculin into the eye. The intradermal test came into use in 1930. In addition there were microscopic examinations and later, cultural tests of expectorate, milk, etc. Until about 1935 loss from removal of open cases was borne wholly by the owner, but later this was supported on a co-operative basis. Progress made is shown in a graph. The number of herds under control rose from something over 1,000 in 1920 to 15,000 in 1944; in the same period the number of examined animals rose from some 20,000 to 230,000 and the number of TB-free herds from a few to 12,000. The percentage of reactors was reduced from over 30 to 5. Close control of the entrance of purchased cattle into enrolled herds was not begun until 1929. The graph shows that comparatively little progress was made in TB control generally until 1932, after which date there were great advances. JOHNE'S DISEASE received attention during the same period, the Animal Health Service

carrying out special examinations and allergic tests with avian tuberculin or johnin. In 1942, more intense control work (no details) was started. Since 1920 an attempt has been made to control BOVINE BRUCELLOSIS by a live vaccine; in 1930, systematic testing of herds was introduced and by 1935 had extended to 300 herds. INFERTILITY in cattle has for long received attention and since 1939 artificial insemination has been used.

The section of the publication devoted to the work of the year 1943–44 opens with a list of the managing committee of the Health Service, omitting, curiously, the name of the technical director, who appears to have been, as in many years before, Dr. VEENBAAS. Statistical summaries of biological products issued are also given, together with a survey of the diagnostic examinations performed.

In the campaign against BOVINE TUBERCULOSIS 228,000 cattle in 14,850 herds were tuberculin tested. There were 11,565 reactors (5%) and 11,760 herds were free of infection. These figures include 400 herds tested for the first time, in which the reaction percentage was 16.6. Great attention was paid to the detection of open cases, usually by the microscopic examination of sputum, aided in some cases by g. pig or cultural tests: these methods are discussed, but the total number of open cases so found is not given. Several experiences with TB-free herds are related. It was expected that they would rise in number to 12,000 in 1944. In 84 cases of open TB, which were detected, the average age was eight years two months; only 22 were under six years of age. The average production [time period not clear] from these animals was 4,628 kg. of milk and 183 kg. of butter, which is greater than that of control animals free from TB.

111 cattle were slaughtered after reacting to the johnin test. Judging from the result of tests carried out in two successive years, this test is not of very high accuracy, unless it is possible for cattle to recover from the disease in the course of a year. Numerous faecal examinations were also performed and the results used to indicate the most and least infected parts of Friesland. This is shown in a map: the centre area was most heavily infected, with over 12 cattle per 1,000 affected; large herds were most heavily infected. It is intended to investigate the relationship between the incidence of JOHNE'S DISEASE and the calcium content and pH of the soil, and some preliminary figures are given. A lower percentage of positive faecal samples was observed in midsummer than in winter. The significance of this is not yet understood. In BOVINE BRUCELLOSIS control, 340 herds were serologically tested and 33% of the cattle reacted positively, a disappointing result after ten years' work. During the year SARCOPTIC MANGE in cattle was common and 1,700 animals in 135 herds were treated twice by the SO<sub>2</sub> gas cell method which, though cumbersome, gave good results.—J. E.

See also absts. 2427 (committee on standard cultures, Amer. Nat. Tuberc. Ass.), 2508 (British Empire Cancer Campaign, 1945).

## BOOK REVIEWS

HARVEY, W. C. [M.D., D.P.H., M.R.San.I.; Medical Officer of Health, Borough of Southgate, (Lt.-Colonel, R.A.M.C.)], & HILL, H. [F.R.San.I., A.M.I.S.E., F.S.I.A.; Sanitary Inspector, Axbridge Rural District Council.] (1946). *Milk: production and control*. pp. viii + 512. 211 figs. London: H. K. Lewis & Co., Ltd. 2nd Edit. 8vo. 37s. 6d. 2663

This book, which first appeared in 1935, has been brought up to date and the authors are to be congratulated on producing a treatise dealing with all aspects of liquid milk production from the cow to the consumer. It is clearly written and well printed, and the 211 figures

are excellently reproduced; the whole volume is most readable. There are 12 chapters, three appendixes and a concise index.

Many of the subjects dealt with are controversial, as for instance the lay-out of the buildings, the types of cowshed, the Accredited Producers' Scheme and the heat-treatment of milk, but the authors discuss them fairly, giving the chief points made by those of different opinions.

The chapter on designated milk samples and the summary of the legislation now operative in England and Wales are both excellent, but the Scottish regula-



tions are not included. Perhaps the best chapters are those on clean milk production, the distribution of milk and the treatment of milk by heat.

In a work covering so large a field it is, perhaps, only to be expected that some parts are weaker than others, but it seems unfortunate that the writers dealt with so many veterinary matters without ascertaining the latest veterinary knowledge and opinion. As an instance, on p. 42 it is stated that the central permanent incisor teeth of the cow show themselves at the beginning of the animal's second year. On page 62, in discussing the subcutaneous tuberculin test, the authors give the normal temperature of the cow as 102°-103°F.; yet they say that after the injection of the tuberculin, a reading of 103°-104°F. is considered to be doubtful. They also assert that animals reacting to the intradermal test appear dull and listless, with loss of appetite; this is surely not usual. In the chapter dealing with diseases of dairy cattle on p. 69, rabies, a disease most unlikely to occur in the British Isles to-day, is described as synonymous with lockjaw. The section on the planning and the construction of cow-sheds, on p. 77, makes scanty reference to the court system of dairying, stating that this method is impracticable in districts which experience severe winter weather. In practice, however, this system is increasing in popularity and has been found very satisfactory, especially in the north-east and other parts of Scotland. In dealing with the ventilation and lighting of cow-sheds the authors make no mention of the Findlay system, nor of the open ridge along the roof span which cannot be closed. It is also rather surprising that the authors do not condemn the system of housing cows in a double row, head to head with only a five-foot passage between the rows, which from a veterinary standpoint has long been considered as highly dangerous to the health of the cattle.

On pp. 249 and 256 the authors criticize the disadvantage to an owner of a licenced designated herd that he should have to pay a licence fee and have to bear the expense of the veterinary examination of his cows, and also that the owner should have to pay for the testing of a "T.-T." herd. In practice, since 1938, the Ministry of Agriculture has performed these inspections free of charge to the producer. Another rather extraordinary statement is made on p. 243 that animals added to a licenced "T.-T." herd coming directly from an attested herd or another "T.-T." herd must be tested on arrival and if they pass the test, must be isolated and retested again after two months before being added to the herd. This of course is not the case: such animals, provided that they passed the last test in the herd of origin, may go directly into the new herd without any further test.

The authors suggest that the conditions for the Attested Herds Scheme are so severe that few farmers will be able to qualify for the scheme and that the present incentives are not enough. At the end of June, 1946, 20.42% of all the cattle in Wales were attested and no less than 25.3% of all cattle in Scotland, with 81.47 and 71.16% respectively of all cattle in the two leading counties.]

The book ends with three useful appendices, the first giving the forms of licences for milk producers, the second, educational bulletins for producers and distributors and the third, types of inspection cards. The book should certainly be owned by all interested in the production of milk on a large scale.—D. S. R.

— (1945.) **Microbiology and epidemiology.** [Edited by BABSKY, E. B., KOCHERGIN, I. G., & PARIN, V. V.] pp. 158. London: Medical Publications, Ltd. 8vo. 15s. 2664

This symposium, by a number of leading workers in various specialities, is one of a series entitled "Achievements of Soviet Medicine in the Patriotic War", which gives a better idea of its scope than the main title. The bulk of the matter deals with human disease but there is much of interest to the veterinarian.

Tularaemia was widespread during the war and caused serious difficulties for both Russian and German armies. The Germans destroyed cats on the grounds that they were susceptible to the disease and that by reason of their close association with man they were a potential source of infection. The Russians, on the other hand, used many thousands of cats to control the rodent population. It is claimed that this was a useful measure and that no cases were recorded of infection in human beings from cats. For diagnosis, a skin reaction was used and for immunization, a killed vaccine. It is stated that in soldiers, infection was usually contracted by inhalation of dust from straw or hay polluted with the excreta of infected rodents. There is considerable information on rodent control. Enormous multiplication of rodents and mass migration occurred in the vicinity of the front line. A novel means of protecting storehouses against rats was found by surrounding the buildings by a wall of snow 50-80 cm. high, the outer surface of which was sprinkled with water which froze and formed a slippery coating of ice up which the rats could not climb. It is said that continuous walls of this type, several miles in length, were used to block the path of rats on the move.

New insecticides for the destruction of lice were developed and are described. Preparation K (a bisethyl xanthogen) was found to be very effective. The Risi polyvaccine which contained in a single dose the antigens of typhoid, paratyphoid, cholera, dysentery and tetanus is described. Reactions following its use are said to have been mild. In the prophylaxis and curative treatment of anaerobic infections of war wounds (gas gangrene), bacteriophage was used successfully. A method of preparing dry bacteriophage is described.

There was considerable research on the epidemiology of neurotropic virus infections. The importance of animal reservoirs of such viruses is stressed and the concept of variation in pathogenicity is developed. Evidence suggested that such pathogens might become practically saprophytic on occasion but remain capable of regaining virulence when environmental conditions were radically altered. This explained latent foci of infection becoming manifest in areas under war conditions.

A chapter is devoted to phytocides which are volatile substances found in a number of plants, especially garlic and onions. These substances are capable of killing protozoa in cultures if a portion of the vegetable substance is placed close to, but not touching, the culture; garlic and onion phytocides are capable of destroying bacteria as well as protozoa, cultures of staphylococci and streptococci etc., being killed within a few minutes. Even the BCG strain of *Mycobacterium tuberculosis* is killed within 5 min. by the volatile phytocides of onions and garlic. They are stated to have been used successfully in clinical medicine, especially in the treatment of infected wounds.—M. C.

See also absts. 2424 (fast milking and early control of mastitis), 2499 (ticks of Portuguese East Africa), 2657 (list of poultry books).



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